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NEWSPAPER

The IBM 370/148 announced last week provides a maximum main memory of 2M characters. Internal performance speeds range up to 43% faster than the 370/145, IBM said.

Reloadable Control Storage Marks Two Models Added To IBM 370 System Line

By E. Drake Lundell Jr.
Of the CW Staff

WHITE PLAINS, N.Y. – Increased control storage that permits more supervisory functions to be resident within the system is the key to the increased performance levels of the 370/138 and 370/148 announced by IBM last week.

The systems perform instructions 26% to 43% faster than their respective predecessors, the 370/135 and 370/145, primarily because of an extended control program support implemented in the control storage, the firm said.

The price and performance benefits of the systems are dramatic enough for some industry observers to claim the systems represent the start of an entirely new line of computers from IBM rather than the culmination of the more than six-year-old 370 line (see related story on Page 2).

Most users with 370/135s or 370/145s can field-upgrade their systems to "the internal performance levels" of the 138s and 148s, IBM said, but they will not get all the features even at a relatively steep price. The upgraded models are the 370/135-3 and the 370/145-3.

In addition to the processors, IBM also announced a lease/rental plan that combines the provisions of the former Term Lease Plan (TLP) and Monthly Availability Charge (MAC) rental plan and reduced prices of the machines still available under TLP. The CPU lease plan is now priced under MAC prices, IBM said.

The systems use 2K Mosfet chips in the main memory and in the reloadable control store as do the other VS 370s. In contrast, the 370/135 and 370/145 use bipolar memory technology.

CPU cycle times for the 370/138 range from 275 nsec to 1,485 nsec depending on the specific instructions, IBM said, while the range is 180 nsec to 270 nsec for the 370/148.

The Model 138 comes with either 500K or 1M characters of main memory, while the 148 comes in either 1M- or 2M-character configurations only.

The reloadable control store in each system is 128K characters, five times the capacity of the previous 135s and four times the previous 145 capacity, the firm said. It is loaded from the console file by diskette, but it is not accessible to the user, IBM said.

The extended control program support implemented in this control storage "reduces the processor time needed to execute certain frequently used supervisor functions in OS/VS1 and VM/370," IBM said.

For example, the firm explained such functions as Virtual Machine I/O, Storage Management, Page Management, Supervisor Call Handler, Privileged Instruction Interfaces, Dispatching and Virtual Interval Timer would be stored in the reloadable control store under VM/370.

Under OS/VS1, such things as Storage Management, the I/O Supervisor, Supervisor Call FLIH, System Trace and Page Management would be in the reloadable control store, the firm said.

Users of VM/370 on the systems can realize a reduction of up to 55% in the processor cycles required for supervisor operations, according to the vendor. For

(Continued on Page 2)

Bell-Fostered Reform Act Shown To Have No Impact on Consumers

By Ronald A. Frank
Of the CW Staff

CLEVELAND – Despite its name, the Consumer Communications Reform Act of 1976 will have no direct effect on the cost of phone service to the average residential user.

This was the consensus of opinion at a recent debate on telecommunications policy held at Cleveland State University for national consumer group representatives. Despite claims of potential increases in residential phone rates, members of the telephone industry were not able to identify a direct consumer impact from nonpassage of the Reform Act which is pending before Congress.

The day-long session included representatives of the Bell System, independent telephone companies, Federal Communications Commission (FCC), specialized common carriers, independent data communications equipment suppliers and others who tried to interpret for consumers the industry competition fostered by the specialized carriers and noncarrier equipment suppliers.

Planning for the conference was underwritten by a $20,000 grant from the Bell System and the U.S. Independent Telephone Association to gain consumer support for the Reform Act.

Sol Harge, director of the Cleveland Consumer Protection Association, introduced the debate by saying it had been impossible to find a consumer representative who understood the legislation well enough to speak on the subject.

The issue raised by the Reform Act is whether the consumer will have the right to choose his own equipment. The issue is not one of competition within the industry, according to Walter Hinchman, chief of the Common Carrier Bureau at the FCC.

The telephone company has failed to

(Continued on Page 4)

CW Photo by R. Frank

Walter Hinchman

Honeywell Level 66 T/S Units Support Heavy Interactive Use

By Esther Surden
Of the CW Staff

WALTHAM, Mass. – The three Honeywell Series 60/Level 66 mainframe models introduced last week were designed to give users with heavy time-sharing requirements approximately twice the performance of Honeywell's batch-oriented models while maintaining comparable batch performance, a spokesman said.

Enhancements to existing Level 66 models and a revised entry-level configuration, the 66/05, were also announced.

The three time-sharing systems, the 66/07, 66/17 and 66/27, correspond to the firm's 66/05, 66/10 and 66/20 batch models and are best suited for service bureau, educational, scientific, engineering and government applications, Honeywell said.

They are intended to be an independent family of time-sharing systems apart from the earlier models and are field-upgradable only within the family, the spokesman noted. Existing Level 66 users cannot field-upgrade to the latest systems, he added.

Hardware changes have been made to the Level 66 CPU to accommodate the increased time-sharing capabilities; four printed circuit boards were redesigned, representing a 10% to 15% logic change in the CPU, the spokesman said.

The Gcos operating system has also been enhanced, Honeywell said, so all programs running on earlier Honeywell models can be run on the time-sharing models.

The basic Model 66/07 with 96K words of 4K MOS memory and a Datanet 6624 front-end processor can support 24 asynchronous communications lines.

A 128K Model 66/17 and the Datanet processor accommodates 48 lines while

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Sanders CRT Works Under SDLC At SNA Interface Demonstration

By Ronald A. Frank
Of the CW Staff

NASHUA, N.H. – Sanders Data Systems last week demonstrated a working interface that allows its IBM-compatible CRT terminals to operate under IBM's Systems Network Architecture (SNA).

Using a Sanders 8170 series CRT with a programmable controller, the demonstration included both IBM and Sanders terminals operating under Synchronous Data Link Control (SDLC) to a 370/158. As part of the demonstration, a typical insurance data base was accessed using first an IBM 3270 and then a Sanders 8170 terminal, both using SDLC.

The Sanders SNA/SDLC interface included several modifications to the Sanders controller to allow the 8170 CRT to emulate an IBM 3270 Model 12 display. The interface consisted of a modem interface board which detects SDLC flag characters and performs zero insertion and deletion; plus the controller had about 1.5K bytes of software to perform the emulation and respond to the SDLC format, a spokesman said.

The SDLC transmissions were sent via a four-wire unconditioned private line facility at 2,400 bit/sec using Bell 201A3 modems. The 158 in the Sanders DP center was operating under IBM's Virtual Telecommunications Access Method (Vtam) with IMS/VS and CICS/VS. A 3704 front end to the 158 was operating

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IBM 370/138, 148 Really 'Early 380s'?

By Ronald A. Frank
And E. Drake Lundell Jr.
Of the CW Staff

WALTHAM, Mass. – The IBM 370/138 and 370/148 "may be described as early 380s programmed to act like 370s," according to James Peacock, editor of *EDP Industry Report*, which is published by International Data Corp. (IDC), an industry research firm here.

And that seems to be the early line on the two systems announced by IBM last week – they represent the start of something new rather than the culmination of the old 370 line.

The significant increase in the capacity of the control storage on both machines, which permits more operating system macros to reside in the firmware, will make upgrades to the virtual machine concept more practical, industry sources said, and clearly indicated IBM is fully endorsing the virtual machine concept.

Previously, users had been hesitant to move to the virtual machine systems, but the increased control store should ease the upgrade, they said.

In addition, the pricing of the systems is extremely interesting, the sources said. The CPU and memory for the 138 and the 148 carry a purchase/rent ratio of 38 months to 40 months while most previous IBM CPUs carried around a 48-month payout.

By making the Term Lease Plan (TLP) price lower than the Monthly Availability Charge (MAC), users are encouraged to sign up for longer term leases. This was probably designed to get user commitments for a longer period as a hedge against the 148- and 158-like CPUs now reportedly about to be introduced, the sources said. Many of these machines are of Japanese origins, they added.

The higher prices for the field-upgraded 145s and 135s are believed to lock in most purchase users, many of whom do not yet have enough of a financial write-off on their equipment to justify a CPU move at this time.

The easier conversion to VM/370 is considered a prerequisite for later model introductions by IBM. Upgrades to virtual operating environments by users, especially the VM/370 operating system, are believed to be IBM's goals.

Lower lease/purchase ratios on the 138 and 148 will make life harder for the third-party leasing plans. It may also convince current lease customers to convert to a newer plan with the 138 and 148.

IBM Extends 370 System Line

(Continued from Page 1)

OS/VS1 users, the savings on the 138 were measured at 13% to 18%, IBM said, and at 9% to 20% for the 148.

The systems are supported by OS/VS1, VM/370 and DOS/VS, the firm said.

In addition to the internal performance improvements with the 138 and 148 systems, IBM claimed they also offer increased system throughput when compared with their predecessors.

The batch processing throughput of a 370/138 running a representative set of selected DOS/VS jobs was measured at 1.18 to 1.38 times faster than a similarly configured 370/135, IBM said.

The batch throughput on the 370/148 for the same type of job mix under OS/VS1 measured 1.03 to 1.47 times faster than a similar 370/145, the firm said.

The instruction execution rate of the 370/138 was said to be 29% to 36% faster than the 370/135, while the rate for the 370/148 was measured at 26% to 43% faster than a 370/148, the firm added.

The systems include a 3270-type display console of 1,920 characters, but this feature is not available to field-upgraded 370/135s and 370/145s.

In addition, the systems also have an adapter for attachment of an optional IBM 3286 Model 2 printer for hard-copy output of the console information, the firm said, adding this too is not available with the upgraded units.

A version of the 3203 printer which runs at 1,200 line/min is also available. It attaches to the systems through an Integrated Printer Adapter (IPA) which IBM also introduced last week for its mid-range machines.

One or two of the 3203 Model 4s can be attached to a 138 or 148, and the IBM 1403 printer can be attached to the 370/138 via the IPA, the firm said.

Several features optional on the 370/145 and the 370/135 are standard on the systems, including APL assist, clock comparator and CPU timer, floating point, extended precision floating point, conditional swapping (for the 370/138 only) and block multiplexer channels.

Under the Agreement for Lease or Rental of IBM Machines for the 370/138 and 370/148, users can elect either a 48-month contract period or monthly rental, with purchase credits the same as those under TLP or MAC.

However, the 48-month lease costs 9% less per month than the rental plan. Previously the prices for MAC and TLP had been the same except that the TLP customer received rate protection and had unlimited use of the machine while MAC was limited to 176 hour/mo usage.

At the same time IBM announced the lease/rental plan, however, it also announced that as of July 1 the monthly lease charges in effect under TLP would be reduced by 9%, bringing them in line with the provisions of the latest plan.

Under a 48-month contract, a 138 leases for $8,730/mo with 500K main memory and for $11,415/mo with 1M characters. Monthly rentals are $9,600 and $12,550 while the purchase prices are $350,000 and $435,000 respectively.

The 370/148 under the four-year plan leases for $17,280/mo with 1M characters and for $22,650/mo with 2M characters; the monthly rental is $19,000 and $24,900 and the purchase price tags are $689,000 and $859,000 respectively.

The 1M-character 370/138 will be delivered in this year's fourth quarter, while the 500K unit will be delivered in the first quarter of 1977. The Model 148 in both memory sizes will be delivered in the first quarter of 1977, the firm said.

Users May Have Jump on Upgrades

WHITE PLAINS, N.Y. – Users who decide to upgrade their installed IBM 370/135s and -145s to the capabilities of the 370/138 and -148 introduced last week may already have some of the required options running on their systems.

To upgrade a 135 in the field, a new gate is attached with the new instruction execution unit, the prerequisite extended floating point (if the user has not already installed this as an option) and the increased reloadable control store in addition to some power units.

Any 135 can be upgraded to a 135-3 in the same memory size for a price of $120,000, IBM said.

Two gates have to be added to a 145 for the field upgrade, the firm said, and they contain the instruction execution unit, the larger capacity control store and power components, plus the prerequisite word buffer, clock comparator and CPU timer if they have not already been installed as options.

The basic price for the 145-2 upgrade to a 145-3 is $190,000, IBM said.

However, the purchase price for a 135-3 or a 145-3 is more than twice the purchase price of a comparable 138 or 148.

The purchase price on a 500K 135-3, for example, would be $721,500 and it would rent for $16,040/mo, while the same sized 138 would carry a $350,000 price tag and a monthly rental of $9,600.

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Decisions

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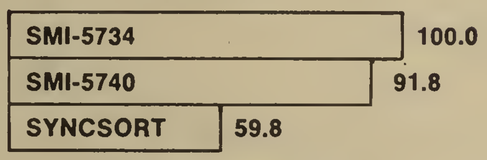
Even the Ph.D.'s around our place regard our discovery with a certain amount of awe. They refer to it, in hushed tones, as the "SyncSort Factor."

It's a progression that goes something like this:

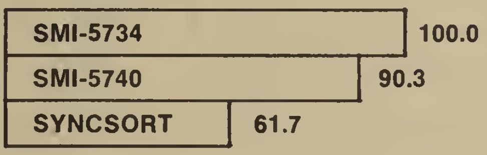
1. IBM will continue to make and market computers. (That seems like a safe $2 bet.)
2. The busy people who use these computers will naturally require the best sort package they can obtain. (Sorting is the most frequent job on any commercial computer.)
3. These people — being intelligent men and women — will sooner or later find their way to SyncSort III-and-a-half. (It's the best sort package on the market.)
4. None of the foregoing will harm our business. (We will continue to update our package so that it will always stay ahead of the competition.)
5. This will lead to more sales and more improvements. (Maybe we should call our discovery the "Law of Perpetual Sorting Improvement!")

If you'd like a graphic representation of the "SyncSort Factor" take a look at the picture below. These graphs depict what happens when you match SyncSort III-and-a half against other sorts on the market today:

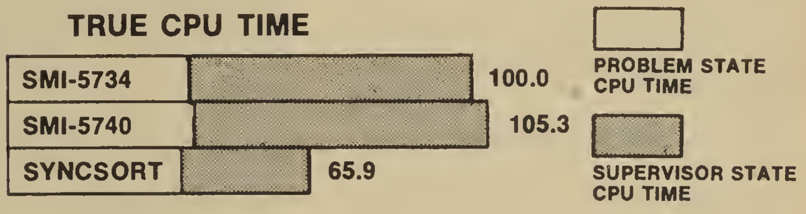
I/O ACTIVITY



ELAPSED TIME



TRUE CPU TIME



Performance is, of course, the bottom line in sorting. But it's not the only thing you should consider in choosing a sort package. Is the sort versatile, for example? Will it support 3350 devices in their native mode without having to sysgen a new system? SyncSort III-and-a-half *will*.

And how's the sort support? Will anybody help you phase the package in when you start using it? If you call the other supplier with a tricky little question, will there be anybody there willing to take the time and effort to give you a reasonable answer?

We will. In fact, we *like* receiving questions from users. It's a hangover from the days when we were pioneering all those developments that opened up the sorting industry. Once an explorer, always an explorer!

The foregoing are some reasons why SyncSort has been so successful in penetrating its market. (In fact, we think we may have obtained a bigger slice of our market than any other software product.)

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Debaters Find Reform Act Has No Impact on Consumers

(Continued from Page 1)

demonstrate telephone consumers should be denied the use of their own noncarrier equipment, Hinchman said, adding that to date the backers of the Reform Act have not shown this has an economic impact on anybody's phone bill.

FCC decisions establishing the specialized carriers and allowing the interconnection of noncarrier equipment were actually "tinkering with the fine working machine" that is the telephone network, according to E. William Henry, counsel for Continental Telephone Co. Unless the Reform Act is passed by Congress, basic phone service will be lower in quality and higher in price, Henry told the attendees.

The only telephone users who will benefit from current FCC policies are hig business and a small group of rich residential users, Henry said.

Several speakers during the day repeated the Bell claims that phone rates for the average user will go up as much as 70% if Congress does not act to reverse current FCC policies. Consumers repeatedly asked how this claim could be substantiated, but speakers said Bell accounting methods made it impossible to interpret financial impacts on any one group of phone users.

CW Photo by R. Frank

Paul Muench

"We are not crying wolf," Paul Muench, AT&T director of policy and regulatory matters said. AT&T pricing policies will not work in an atmosphere of selected competition, which will slow the rate of technological development of the Bell System, he said.

"Competition as it now exists is rigged competition, and the FCC keeps changing the rules," Muench said.

Speaking for the specialized carriers, John Guttenburg, vice-president of Data Transmission Co. (Datran), said the public is being asked for statutory blessing of the Reform Act by a massive lobbying effort by Bell in an attempt to achieve a complete monopoly.

AT&T is forced to keep on its toes by competition so it wants to turn the clock back, he said. "It won't happen because the consuming public won't let it happen," Guttenburg added.

"The telephone is a pay-forever device which costs the average consumer about $2,000 over his lifetime," according to Ed Spievack, counsel for the North American Telephone Association.

Instead of this pay-forever approach, the FCC is giving the consumer an option of buying a phone for a one-time cost of $15 to $20, he said. The Consumer Communications Reform Act would more accurately be called the "Monopoly Protection Act," he added.

Glenn Watts, president of the Communications Workers of America, said there is a trend to building bad products such as "disposable plastic radios" and he said the Reform Act was an attempt to prevent this kind of thing by setting proper industry standards.

The Reform Act is designed to achieve the total destruction of competition, Herb Marks told the session. "They are going for a total kill of an industry" and all added costs will be borne by the consumer, according to the counsel for the Independent Data Communications Manufacturing Association.

Three T/S Machines Extend 60/66 Family

(Continued from Page 1)

the 128K 66/27 with the Datanet 6632 front end supports 64 or more lines, Honeywell said.

The 66/07 is in the range of the Univac 1120 or the Burroughs B6748; the 66/17 compares to the Univac 1140 and the Burroughs B6750; and the 66/27 can be compared to the Univac 1140 and a larger B6750, Honeywell said.

The basic configuration for the entry level 66/05, also introduced last week, includes a CPU with 96K words of 4K MOS memory, system console, card reader and 1,100 line/min printer, Honeywell said.

Introduced to operate with the 66/05 were a four-communications line Datanet 6616 front-end processor, MSU0402 disk storage unit providing an additional 100M bytes of unformatted disk storage and a MTU4012 magnetic tape "cluster." Up to four of the disk systems can be attached to the 66/05.

The cluster consists of two 75 in./sec magnetic tape units; additional units can be added, Honeywell said.

Honeywell also announced the memory of the Model 66/10 can now be expanded to 356K words from its previous ceiling of 128K words.

In addition, the Models 66/10, 66/20 and 66/40 will be available with free-standing central processors, independent system control units and I/O multiplexers. Previously, control units were integrated into the system package, Honeywell said.

The purchase price of the basic 96K 66/07 with 24 communications lines is $807,888; the 128K Model 66/17 costs $1,080,233 with 48 lines and the 128K 66/27 with 64 lines costs $1,451,716.

The 66/07 can be rented for $17,209/mo on a five-year plan; maintenance is $2,272/mo. The rental price for the 66/17 is $22,396/mo with a $2,636/mo maintenance charge. The 66/27 costs $29,165/mo on the five-year plan; maintenance is $3,350/mo, Honeywell said.

The entry-level 66/05 with the Datanet 6616 processor costs $698,300 with a maintenance fee of $2,206/mo. The system can also be rented for $14,530/mo on the five-year lease plan.

The three time-sharing models, the 66/05 and the system enhancements will be available by the end of the year, Honeywell said from 200 Smith St., Waltham, Mass. 02154.

State Forbids Bank Branches

Court Rules Off-Site CBC

By Toni Wiseman

Of the CW Staff

CHICAGO – The controversy over electronic money machines was stirred up again recently when a U.S. Court of Appeals ruled here that customer-bank communications terminal (CBCT) sites constitute branch bank offices under Illinois law.

But several stays of action by that appeals court and possible action by the U.S. Supreme Court have left the issue in limbo.

In addition, a home-rule measure proposed by Chicago's Mayor Richard J. Daley has clouded the scene.

The court's ruling against two Chicago banks which have installed off-premise CBCTs came in response to an appeal of the definition of a branch bank made by a federal judge last December.

Branch offices are illegal under
law and, according to Judge Her
Will's definition, the off-premise
installed by the Continental Illin
tional Bank and Trust Co. and th
National Bank of Chicago are br

Distance Limitation

The same terminals would be leg
ever, if they were located on or
1,500 feet of a bank's premise
their use were limited to cash with
and payments on installment lo
ready granted, Will said.

Continental and First National
pealed Will's ruling contending t
terminals do not constitute b
since they do not provide ful
banking.

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Here's where we'll be going in 1977:

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Cleveland	April 19-21
Minneapolis/St. Paul	April 26-27
Chicago	May 3-5
New York	May 10-12
Philadelphia	May 24-26
Washington, D.C.	May 31-June 2
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DP-Based ID Cards Planned to Prevent Illegal Alien Entry

By Catherine Arnst
Of the CW Staff

WASHINGTON, D.C. – To help stem the flow of illegal aliens into the U.S., computerized identity cards will soon be issued to all resident aliens by the Immigration and Naturalization Service.

The card is meant to be a secure identification document which cannot be transferred or forged, according to Jerry Webster, program manager of the Alien Document Identification and Telecommunication (Adit) system.

There are approximately 4 million permanent aliens living in the U.S. and about 400,000 more are admitted each year. But there are 5 million or 6 million illegal aliens holding between 1 million and 2 million jobs and drawing an estimated $3 billion in wages, Immigration officials estimated.

Resident aliens currently carry a "green card" as a means of identiciation, "which is not a very secure card by any means," Webster said.

"There was always trouble in the past with counterfeit cards, altered cards or false photos," he said. A computerized system will almost eliminate those problems.

Unique Code

The Adit card that will replace the green card will contain a picture and fingerprint of the bearer, name, place of birth, date and place of admission, the mother's maiden name, the name of the oldest brother in the family and the immigration status.

All this information will be converted to six-digit codes which in turn will be converted by an encryption algorithm to another six-digit number that will be a unique code contained on the card.

The information on the Adit card will be kept in a centralized data bank which will be on-line and interactive, Webster said.

The data base will be operated by the Department of Justice's DP center with a few minicomputers scattered around the country, he said. Adit is currently estimated to cost between $13 million and $14 million for development.

The first cards were distributed in El Paso, Texas, on May 26 for a test run, Webster said. The design of the card and computer system has been going on for three years; complete implementation of the program should be finished in two more years, he added.

"The primary purpose of the data bank is for control at the port of entry. There will be terminals at all ports of entry which will allow inquiries to the file whenever someone presents his card.

"We intend to build a system flexible enough so that an employer can also inquire into the system about whether an alien is in the country legally or not," he added.

How to increase programmer productivity in a COBOL shop . . . for $30

When you think of it, programmer training is pretty haphazard. After a few language courses, a programmer goes into on-the-job training. Which usually means, he's on his own. So if he ever does learn to write efficient, easy-to-read, easy-to-maintain programs, it's largely through his own doing.

A few weeks ago, for example, I looked through the listings of several COBOL programs written by a senior programmer in a medium-sized System/360 installation. To my surprise, the programs were poorly written. They were written in an almost impossible to understand style; there was no structure to the programs; and there were many inefficient coding practices throughout.

My consultant friend tells me that this isn't unusual at all. In addition, he says all too many COBOL programmers are ineffective when it comes to testing and debugging. And they are dreadfully slow when they have to write unfamiliar routines.

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Third, we have two assembler language books (one for DOS, one for OS). These books are so effective that hundreds of programmers have learned BAL from them without any outside assistance. So if you have programmers that can't debug by using assembler language output, one of these books is a must.

Fourth, both our assembler language and COBOL books are loaded with down-to-earth, practical, real-world advice. It's like being able to talk to the lead programmer without interrupting his work. As a result, our books can provide job enrichment at the same time they increase programmer productivity.

Who These Books Are For

Although thousands of companies have bought our books for inhouse training, we believe they're equally good as programmers' guides.

In fact, we believe every System/360-370 installation can profit by having at least one copy of the appropriate assembler language book along with one COBOL book. At $30 for the pair, you don't need much programmer improvement to justify this investment. And in most shops, there's so much to gain.

For instance, the COBOL book covers subjects such as: how to design programs so they are easy to debug and maintain; how to use INSPECT and EXAMINE for isolating free-form input fields; how to improve coding efficiency by using the source statement library; how to improve processing efficiency by using SET and SEARCH for table handling; how to write and call subprograms; how to create and process indexed files; and how to use relative files for special file handling situations. This book covers DOS and OS considerations as well as 1968 and 1974 ANSI standards. Its only major omissions are sort, segmentation, and report writer.

As for the assembler language books, they include subjects like: how to write a subprogram that can be linked to a COBOL program; how to write a routine for bit manipulation or code translation when COBOL is inefficient; how and when to use assembler language for processing ISAM or direct files. And always, these books give that extra level of understanding that can turn an average programmer into an outstanding one.

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If yours is included you could find a quick remedy with a letter to Joe Nestor, Wang Laboratories, Inc., Tewksbury, Mass. 01876 or a call to (617) 851-4111. In California call Carl Tarascio (714) 631-0138. PL93-406 became effective January 1 so you don't have much time left.

WANG

Editorial

Child of Competition

It is too bad some of the strong supporters of AT&T's Consumer Communications Reform Act did not visit a small booth tucked away on the third floor of the recent National Computer Conference.

If they had found the location they would have seen a modem introduced by Universal Data Systems (UDS) [CW, June 21]. Even the vendors of such units will readily admit a modem or data set is not the most exciting piece of equipment available to the communications user.

But this unit was significant because it pointed out the innovation resulting from telecommunications competition fostered by the Federal Communications Commission (FCC).

The modem from UDS operates at 1,200 bit/sec in full-duplex mode over a two-wire circuit. This type of product was pioneered in 1972 by Vadic Corp., and the UDS modem is the second of its type.

Both of these data sets allow a user to operate in full-duplex (two-way) mode over two wires instead of the four wires required by more conventional modems. Both Vadic and UDS are independent modem companies not afraid to innovate with products unavailable elsewhere.

At present, AT&T and the other telephone companies do not offer this type of modem. The Bell 1,200 bit/sec modems require four-wire facilities for full-duplex operation.

AT&T has been working on a data set that duplicates capabilities of the independent units. At one point, AT&T representatives reportedly told prospective customers of the Vadic modem Bell would offer a similar device soon.

Recently, however, AT&T said there were no plans to introduce this type of modem. Perhaps the telephone company will not introduce such a data set because it is more desirable to rent a four-wire circuit than a two-wire circuit to the user.

On the other hand, AT&T may have to react now that two independent vendors are offering a modem that is not in the phone company product line.

If the independent modems could not operate on the phone network (even with the Bell Data Access Arrangement), users would never have had these products. The reason they appeared is because of the FCC decisions that made it possible to interconnect noncarrier equipment.

As this story unfolds, AT&T will probably offer a version of these modems or, more drastically yet, it might offer the Vadic or UDS product with a Bell label on it.

Regardless of what happens, AT&T has not lost sales because it does not have a comparable product. AT&T may be forced to react to the efforts of two small suppliers whose products would never have appeared in a Bell-dominated monopoly environment.

Backers of the Reform Act take note: You are arguing against free enterprise and competition. Is that in the public interest?

Letters to the Editor

Let Bygones Be Bygones; Time for ACM to Get to Work

Now that Herb Grosch [CW, May 31], Anthony Ralston and George Glaser [CW, June 21] and Jean E. Sammet [CW, June 21] have gotten the stuff off their chests, the time has come to mollify the feelings and get to work, ladies and gentlemen of the Association for Computing Machinery (ACM).

Sammet's public statement that she accepts the election decision of the ACM membership and is prepared to cooperate with Grosch is exemplary; it sets the direction for the future.

I do not agree that the nomination by petition does not mean much, when such nominees win both offices – the president's and the vice-president's!

May I suggest an experiment to test this premise? In 1978, please choose a prominent, experienced and capable past president (or vice-president), nominate him or her for ACM president's post by petition and let's see what happens! Just to the contrary – election of nominees by petition constitutes a startling constitutional and popular mandate.

It is good to hear nobody (so far) wants the responsibility (now) for the preelection flyer with the signatures of past presidents and their unsuccessful election opponents.

A.V. Dundzila

Chicago, Ill.

Beware of Vendor Promises

Hats off to Peter Maraveleas in the article, "User Claims His Univac 90/60 Can't Compare With Spectra 70" [CW, June 21].

I wonder how many people in DP have become unemployed because they believed the statements of a marketing representative who is trying to make a sale.

Michael Thompson

Belle Chasse, La.

Death Not Result of DP Error

The headline, "Data Entry Backlog Cited in Death of Motorcyclist" [CW, June 21], is really in error and poor taste.

In the story, the motorcyclist was observed running a red light and, during the chase, a faulty report was received stating the motorcycle was stolen. Regardless of this, the person was still being chased for running a red light and would have been chased if the vehicle had not been stolen.

The fact that the entry was incorrect, missing, etc. really had no effect on the chase other than to add more charges to the original crime.

William McClanahan

Columbia, S.C.

Card Reader for IBM 3/8 Sought

Sinclair Community College in Dayton, Ohio, has an IBM 3/8 installed in its computer center. At present, we are diskette-oriented with this machine, but we would like to attach a punched-card reader to it.

The IBM representatives in Dayton tell me it is technically possible to attach a 1442 card reader/punch to the 3/8.

I am certain there are other people who are interested in attaching a 1442 card reader to their 3/8s. I would appreciate it if these people would make their needs known to their local IBM representatives.

After they have done so, I would like to have them notify me about their contact with IBM, giving specific details as to when the request was made and the IBM individual whom they contacted. I will then prepare a report on this situation for IBM which will indicate the specific market for card reader capability on the 3/8.

B. Albert Friedman
Program Director, DP

Sinclair Community College
Dayton, Ohio

Data Past

Five Years Ago
July 7, 1971

ATLANTA – A customer of the Control Data Corp. service center here filed an $8 million suit against the mainframe maker charging "false and fraudulent misrepresentations" and "erroneous processing" characterized the company's Cybernet time-sharing network. The customer, Computer Credit Systems, Inc. (CCS), alleged the "misrepresentations" included CDC's claims that the time-sharing network had adequate backup and that the service would cost less than the services provided by the previous service bureau used by CCS.

– – –

WHITE PLAINS, N.Y. – IBM announced the 370/195, which came with a projected price tag of $7.8 million for the cream-of-the-crop 4M-character model.

Eight Years Ago
July 3, 1968

WASHINGTON, D.C. – The U.S. Department of Defense indicated the problem of developing a "common interface between operational software and the data management and other supporting programs" as well as a "common man/machine interface" limited the possibility of the department buying computers from more than one manufacturer for the World Wide Military Command System.

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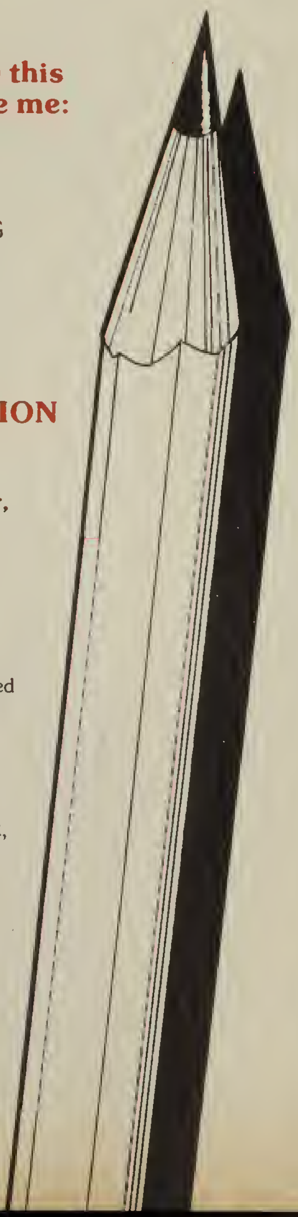

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Detach here, fold, and place in post-paid envelope attached through binding.

Gerhard Neumann

Some months ago I did a column about one of the two men who most influenced my career in science, and then in computing. And next year, perhaps, I'll do one on the other, Wallace Eckert. Today, though, I am writing about another kind of man. Before I met him I was already set on course – for better or for worse! But there have been only a few men and women I've really admired in my career: Johnnie von Neumann, Watson Senior, Jack Jones perhaps – and Gerry Neumann.

Two reasons to tell about him today. The obvious one is that I met him, and his vigorous wife and partner Clarice, on Japan Air Lines the other day. Fifteen years, I'd guess, since we saw each other: terrific! But the other is that he reminded me, as vividly as if it were only yesterday, why General Electric failed so miserably in the computer business – and Philips in Holland, and Xerox and Singer, and to a considerable extent RCA and AEG/Telefunken. Neumann is a rock-hard living monument to a GE *success*, and to talk to him once more after all these years convinces me over again that GE could have succeeded in computers too. But in computers, it had no Gerhard Neumann.

Gerry (hard G) is today one of the ten top men in the gigantic $13 billion General Electric enterprise; as a vice president and group executive he heads all their work in jet engines and associated businesses, and reports directly to the presidential office. I forgot, in the excitment at Haneda when we recognized each other, to ask him how many men and women work for him now; must be anyhow 20,000. But Gerry isn't an ordinary executive, and it's central to the CW interest that he isn't a professional, highly-trained manager. What he *is* is a terrific leader, and one of the best jet engine designers ever, anywhere in the world.

Driven out of Hitler Germany, he became head mechanic for Claire Chennault in the China war theater. He put together scraps salvaged from shot-down Zero fighters and produced a working plane which could be evaluated and circumvented. At the end of the war, he was made a U.S. citizen by special act of Congress, at General Chennault's request. Meeting Clarice in Washington – she is a lawyer by profession – he carried her off to the Far East, and they honeymooned in a surplus jeep, driving overland to the Mediterranean. There were no IBM installations in Kabul *then*, believe me!

He worked for Douglas for a while, then came as one of the top engineers to the GE engine plant in Ohio. I had Card-Programmed Calculators when I first met him, and then the Number Six IBM 701. He and his design team were my biggest customers, and remained so when I put in two 704s, and remote data collection, and all the great goodies that the Dan McCrackens and the Don Shells could dream up, pre-even-FORTRAN. We had our battles; he was and is one tough, tough citizen. But we were both activists, both sure of our mission. His was to design and build engines efficient enough, durable enough, cheap enough to compete with giant Pratt & Whitney. General Motors (Allison) was faltering, Curtiss Wright and Westinghouse were clearly already out of the running. Neumann was determined to succeed. He drove his designers, he struggled to improve the enormously expensive test facilities, he personally laid out the first variable-stator prototype engines. He browbeat generals, many of whom were personal friends, and reluctant airline presidents. And he made it all come together; he and his people, many of whom have worked with him for over twenty years, and the solid Number Two in the world engine business, having passed Rolls Royce *en route*.

General Electric had a management philosophy. It said, among other things, that a trained and expert manager could manage anything: Memorex today is run by a graduate of that school. Gerry despised the idea; he *demanded* the engine business be run by someone who lived and breathed engine design, engine manufacturing, engine application: himself! It was close, very close; long after I left Evendale for the Phoenix computer department he was still struggling. With support from top executives who had been over him in Ohio, he got his chance – and General Electric stayed in aircraft propulsion.

Across the country, in computers in Arizona and in nuclear power in California and New Ork, the "professional manager" nonsense flourished. Men who could not have cared less for our exasperating but wonderful tool were put in charge in Phoenix, in Oklahoma City, in the Bull factories and offices in France. They had read the Blue Books, they had sworn allegiance to the Smiddy/Cordiner management philosophy, they worked diligently – but blindly. And they failed miserably.

Nor was it just IBM towering over them. There was no such opponent in nuclear power: just dumb Westinghouse. But similar philosophies failed there also. And Pratt & Whitney was surely the IBM of the engine field, yet Neumann succeeded. It took enormous expertise, enormous commitment, unrelenting toughness. And above all, it took leadership. Gerry had it, and the other things as well. It's good to have seen such a man.

Herb Grosch

In Word-Processing Applications

Use of Minis Provides Viable Alternative to Maxis

The Taylor Report

By

Alan Taylor, CDP

Five-year-old exhibitions generally show either the staying power of the industry segment involved or else demonstrate obstinacy in the face of apparent failure.

Syntopican V, an exhibition held in New York City recently, seems to be in the "successful" category and was an illustration of how small-scale computer logic has been developing in the word-processing field.

Beyond that, however, just about every Syntopican booth raised the question of how the future desktop machines would communicate with the larger maxicomputer systems.

That they would do so in the near future was clear, but whether it would be over network wires, on a real-time basis or by periodic batch transfers was anybody's guess or at least a decision that varied with the economics of the particular situation.

One approach, however, struck me as being of general interest, because it suggested an alternative way of thinking about the provision of in-house maxicomputer capability backups. The first part was shown on the Base Information Systems stand. The rest was promised by the firm in a few months.

Base's System

What could be seen was a cluster approach, with up to eight desktop Hewlett Packard Co. (HP) 2640A terminals surrounding a Honeywell Level 6 minicomputer. The terminals were served by Ultra-Text word-processing software with good page header, footnoting, sub- and superscripting operations, all in the traditional manner.

Ultra-Text has a number of features I like, both for themselves and also for the way that they show progress is being made. For instance, hyphenation – the last time I looked, some of the results of automatic hyphenation were not looking very good.

At the same time, frequency of interruption needed for manual hyphenation was distinctly bad. The question arose whether a mini system could handle the facility.

The answer in Ultra-Text turned out to be a combination of use and simple routines which makes the manual burden acceptable:

- The use of the system is generally for full-width documents with 60 or more characters, together with a certain amount of flexibility (the "hot zones") which reduces the need for any hyphenation.
- The software includes some of the simpler hyphenation rules – double consonants, etc. – and applies them whenever possible. This turns out to be fairly often.
- Manual calls for hyphenation help only occur after neither the hot zones, nor the rules have proved capable of handling the problem.

What I like about this is that the solution has been found to be through simplification of both the requirement and the routines themselves.

This is a case of understanding the application better, rather than having to discover new, highly sophisticated operations. There is less chance of going wrong this way, and reliability is what we need above almost anything nowadays. And the approach is suitable for in-house maintenance and even development.

Extensions to System

What Base promised, but will not be seen for a few months yet, was the addition of a couple of backup related operations to handle the documents being created and stored. These are In-Dex and Context.

In-Dex creates indices. It currently works on 360s or 370s. In itself it is a fully integrated system, with capability of microfiche outputs, sorts and searches. But In-Dex is a maxi system application, rather than a mini system one. And there still is a difference. It uses plenty of main memory, but won't always be operational, so memory costs could be high.

Context is also a maxi system application. Context doesn't deal with indices, but rather with full-text operations – large data bases, proximity searching, free use of synonyms, etc. That's far from a mini operation, needing big disk capability, etc.

And these three, Ultra-Text, In-Dex and Context, are all to be integrated into a single, cohesive, user-oriented system, according to the brochure. So let's look at the economics involved. Where is the equipment to come from to handle these maxi-size applications on a mini?

The answer appears to be in the use of an in-house cluster-supported group of terminals. Here the local need for systems is sufficiently strong that a good size mini, with good operating software, is economically self-supporting. Ultra-Text isn't cheap ($20,000 for the first unit, than $18,000 or $16,000 depending on the size of the cluster); but it can support the mini.

So the mini doesn't have to be bought to support the maxi applications. Instead it simply has to be expanded. And expanding already available minis is even more economically reasonable than using minis in the first place.

Here is where I see the approach being successful. As minis come down in price and up in sophistication, more and more basic in-house applications, such as controlling word processing, will be justified.

The moment such a justification appears, the additional power available by expanding the in-house mini hardware becomes very attractive and powerful – well able to economically challenge the use of maxi systems for even quite complex related operations.

This is what is happening here. Whether or not Base will succeed we have yet to find out (but I'll keep you informed of developments). But what is happening is in-house systems analysts have yet another competitor to consider – the expanding mini.

This is much cheaper again than just a mini in its own right, and may well have all the systems challenge and flexibility of the maxi system at very economical prices.

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Another 'Project Which Failed' Shows

User Often Only Difference Between Success, Failure

By Miles Benson

Special to Computerworld

The Sociology Of Computing

Perhaps I'm a little too close to this "Project Which Failed" to do it justice. Just looking through the musty files in my basement, where I have stored the last remains of Interpol, causes a kind of pall to descend on me.

Over there, on the shelf in the corner, are the listings, several inches thick. That layer of dust on top tells you how often I've looked at them lately.

But here, in my hand, is the really painful part. It's just a binder with a bunch of papers in it, but the papers are the history of all the little events, good and bad, that occurred along the way to the end of Interpol.

Let's thumb through them together. There might be something to be learned in those pages. That's the whole point of a "Project Which Failed" story, I guess.

"Proposal – Fast PLY1 Interpretive Compiler" is the title of the first one. It's dated 10 years ago; that was when it all started. The ideas that expanded into the dreams that solidified into the implementation of an interpreter for the PL/I language are documented there, neatly, a little bit sales-pitchish, but well thought-out.

"PL/I is inevitably the language of the future," it says. "Let's experiment with interpreters as tools to give better programming debugging tools," it says. "High-level languages can be used to do systems programming," it says. A collection of ideas, addressed to a decision maker, saying, "Give me a green light on this project."

Between the first few pages of the binder there's a lot left to the imagination. The green light was turned on, but there's no record of it.

Here, though, is the first status report, three months later. "Right on track," it says. "Hard stuff designed, basic stuff implemented," it says. "Let's do the following in the future," it says.

And only one page and three months further on is an exciting one. "Interpol – Scientific PL/I Interpreter – is now usable," it says. "It lacks a few things," it says. But "try it out," it says.

Here's a meeting announcement, yellowing a little but still readable. "Topic for Technical Staff Meeting This Month – PL/I Interpretive Language Development." A collection of people to review progress in a little more depth.

The next few pages in the binder aren't very interesting in themselves – a bunch of notes, scrawled across the page and sideways in the margins. But these are the rough-hewn forerunners of Interpol's finest hour.

On the following page, here, is the finished product, a paper which was distributed at the PL/I conference that year, telling about Interpol and its design goals and its implementation technique and its special features. And a couple of pages further on, here's the same paper, polished up a little more and published in a leading professional journal.

The next many pages are the glory road through the binder. Letters from readers, sharing insights. Requests for reprints, many with exotic foreign stamps. Inquiries about system availability.

Even now, reading them over, I feel my ego climb several meganotches. "The internationally known computer scientist," I only half-jokingly thought of myself.

Like Grains of Sand

Have you ever poked a stick into a sandbank and watched the sand begin to slide downwards, a few grains at a time, then more and more, until a column of sand above the poke-hole is moving like an avalanche?

Well, the sand was eroding under Interpol, gradually at first, all the time that fame was trumpeting its name to the far countries of the earth. Back home, where usefulness and not reputation is the measure of a project, Interpol was on the road to failure.

The clues in the aging binder are like those grains of sand, showing up slowly. Here's the Interpol user manual, a "how-to" description of the system and a questionnaire sent out with it to evaluate user reactions.

Now, common sense says that next in the binder there ought to be a flock of user questionnaire responses, and perhaps even a questionnaire response summary.

They're not there. Clue Number One. Something is wrong in the potential user community; no one seems to be using Interpol.

Instead, in the binder, there's a quickened pulse of implementation notes, nits and grits and exotica on adding various PL/I features to Interpol, now totally useless but vital and alive when they were written. But still no user responses.

And, even more ominous, there are no analyses of user problems. You can't produce a project like Interpol and do it error-free. No user questionnaires; no user problems; the only possible answer to the riddle is *no users*.

The memories of that realization, flooding back as I look at a page marked "DO WHILE Implementation," blur the page for a moment. The fame of the published paper, the ego pinnacle of the project, is caught now in that ever-faster sliding column of sand.

The worry about lack of users takes a more scientific form now. Here's a follow-up inquiry page in the binder asking what is wrong; calmly, factually ferreting out the reasons why Interpol is an object of user disinterest. Minutes of meetings with responsible managers; notes on discussions with top technical types; the pieces of the answer puzzle begin to fit together.

Into a whole, labeled "Final Report on Interpol Project," the next page in the binder. "Users are busy," it says. "Deadlines for programmers are tight," it says. "Users haven't time to try new techniques," it says.

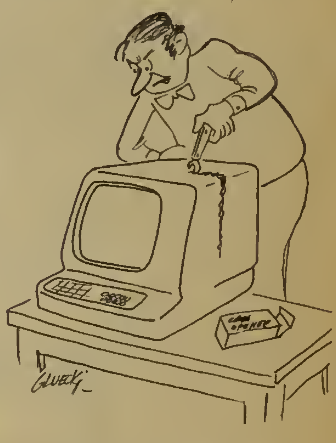
Crash. The last of the sand has hit bottom, and here lies Interpol, tangled into the heap.

In this bastion of real-worldness, where getting the job done is more important than learning to do the job better, innovation is a kind of dirty word. Interpol was innovation. So, for that matter, was the "inevitable" PL/I. And no one had the time to touch them.

When I slam the binder closed, dust rises and that musty smell of aged paper fills the air and the nostrils. Here, next to that copy of "Compiler Implementation" I used for ideas in the Interpol project, is where it goes on the shelf. I guess I'll probably never need to take it down and look at it again.

Interpol was a "Project Which Failed," all right. Right in the middle of the most success a project can ever have. It makes me wonder, when I read the computing literature, how many of those projects, so glossy and elegant on the slick pages of leading journals, are really successes?

And how many, when you get right down to it, are failures as well?



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Although Settling on One System Helps

Easy Installation Causes Some Strains, Users Discover

By Don Leavitt
Of the CW Staff

NIAGARA FALLS, N.Y. – Working with an applications system that is technically easy for the DP staff to install can be a "semitraumatic" experience for some users, according to Jim Biani, management and information systems (MIS) director for Carborundum Corp. headquartered here.

Many users have become hardened to a delay between the time they tell the systems analysts what they would like and when a system is delivered. When such a delay doesn't occur, the emphasis within the development cycle changes, and "80% of the effort" falls on the user, Biani continued.

Under those circumstances, real decisions have to be made by the user and usually much sooner than expected. And that is a tough change of pace, he said.

To help the situation, because under Biani's leadership Carborundum is using an easy-to-install application system, he has put together a DP staff made up of "people I thought had business sense first and who, almost incidentally, knew how to use" a computer.

"In an MIS function, the people who are 'selling' – working with and installing – the systems have to be really cognizant of the functional areas in which they are operating. You'd be hardpressed to go out with the typical 'computernik' and install these systems," Biani said.

MAS Found by Accident

Biani is referring to the Modular Application Systems (MAS) from Martin Marietta Data Systems – and he is enthusiastic about that software – and locally built extensions.

Carborundum's conversion to a user-conscious operation started about three years ago. And it was almost by accident that it involves MAS.

When Biani joined Carborundum in 1973, the corporation's DP capabilities were scattered across the country on a mixed collection of small systems and sometimes clashing operating environments.

Since that approach was clearly inefficient, he saw two needs: a new hardware/software configuration in a new production-oriented facility and a new staff profile. He wanted a new facility because he knew he couldn't "sell" any service capability if he couldn't produce. The selection process took time, but the corporation now has a 1M-byte 370/158 under OS/VS2, supporting 30 high-speed remote job entry (RJE) terminals in remote Carborundum locations.

He brought in "a bunch" of "very specialized technicians who were very good at converting programs and bringing things from a mixed bag to OS mode operations." They have since become the basic operations staff at the 370 center.

Used Diagram as Vehicle

The business-oriented staff was put together next and then Biani and his colleagues began to get specific about what they wanted to provide for the corporation.

Instead of the existing essentially unstructured approach to DP, they envisioned a basic "schematic" diagram of what basic systems they wanted and how they should logically fit together.

The diagramatic approach gave Biani a vehicle – "a language, if you wish" – with which he could talk to non-DP users and be sure of his understanding of their problems before he made a false move. But he seemed unable to find any commercially available software that coincided with his vision of Carborundum's needs.

Then luckily – as it turned out – they had equipment problems and went to a local Martin Marietta data center for machine time. "We got talking, and they mentioned MAS," Biani recalled. "As we talked further, I could see that if we laid the MAS schematic over ours, the fit was so close it was almost scary."

As Carborundum looked closer, the fit seemed even better. MAS didn't cover all the areas Biani had defined, "but it covered the bulk of them and especially the critical nonaccounting areas that would have been most difficult for us to develop."

The internals of the coding "couldn't be called 'super' in terms of mechanical efficiency," he said, "but they were certainly satisfactory." And the modularity meant it could be brought up piecemeal and mixed, where appropriate, with Carborundum coding.

That was important because Biani wanted his staff to be self-sufficient in customizing and maintenance and free to use their own code when MAS didn't fit the company's needs. In fact, though "15 to 20" of the MAS modular elements are in place in various Carborundum locations, the company does not use any of the vendor's financial control programs.

Having "embraced" MAS and its own "schematic" of how systems should go together, Carborundum's management committed itself to support of Biani's approach with publication of a printed and illustrated booklet on System Development Methodology [CW, April 26] which was distributed to all interested people within the company late last year.

IBM Drops Support for OS/MFT, OS/MVT

WHITE PLAINS, N.Y. – IBM has finally dropped the other shoe. Having withdrawn support for DOS several years ago, the vendor has now said support for OS will be phased out in two steps next year.

The change from Class A to Class C support applies to both multiprogramming with a fixed number of tasks (MFT) and multiprogramming with a variable number of tasks (MFT). The change will take place next May 31 for releases 21.0, 21.6 and 21.7 and Nov. 30, 1977 for Release 21.8, IBM told its OS installations.

MFT and MVT were first delivered by IBM in 1966 and 1967. Used on the larger IBM 360s and the nonvirtual 370s, they became OS/VS1 and OS/VS2 in the vendor's newer series of operating systems.

Four years ago IBM told users Release 21 would be the last major "functional" release of the control software for "real" memory 360s and 370s. But it put out several maintenance subreleases until two years ago when 21.8 was delivered and IBM said that was the end of the line.

Under IBM's terminology, Class A support includes centralized programming effort for both enhancements and error corrections and, if needed, free on-site personnel to solve a problem traceable to the IBM software. Class C rules out all free support, but programming and systems engineering services are available at a cost to the user.

If modifications are already available for a problem just discovered by a user, the coding change will usually be provided without cost, even under Class C. In addition, user groups such as Share and Guide have accumulated substantial libraries of OS changes that are available to their members at little or no cost.

Though IBM won't provide support for new problems within OS reported after the change to Class C, the vendor will accept reports of problems up to the changeover date and, if IBM is at fault, provide support free to the user.

In addition, if the experience with DOS is any criterion, the end of IBM support for OS may well signal the beginning of a number of OS enhancement packages from independent software firms.

For its part, by downgrading support for the older operating systems, IBM presumably can reassign the OS programming staff to other tasks. However, since Relase 21.8 was delivered in August 1974 with the understanding that it was the final release, some observers believe there may be little staff left for reassignment.

Other observers consider IBM's abandonment of its older operating systems as a clear indication of the vendor's concern over a current-day problem: the specter of competition from Amdahl Corp., which has already replaced several large 370s and apparently is close to receiving an order from a major manufacturer for as many as 20 470V/6s.

Package Backs Unattended B700 Compilations

OLIVET, Mich. – Installations with Burroughs Corp. B700 computers can schedule and initiate batch compiling of RPG or Cobol programs to be run in unattended mode with the 700BC package, according to the developer, Leo M. Weeks.

The package is a five-program system capable of taking source programs from disk, Weeks said, adding that such a capability was previously unavailable to the B700 user. Up till now, source programs had to be entered on punch cards, requiring an operator to be present, he said.

With 700BC a conversational program sets up a list of programs to be compiled, with their respective options. Once initiated, the Weeks' program takes control of the system, operating without the need for an operator, the developer added.

All programs on one disk can be compiled just as if they had been stacked in the card reader. In addition, 700BC spools the output of the Cobol compilation back to disk so that listings, for example, can be printed the next day when the operator is present to watch for paper jams or other mechanical problems.

While the package can be used to manage a series of consecutive compilations, according to Weeks, its prime value may lie in its ability to run long compiles during nonworking hours, providing more time during the day for normal processing.

The 700BC package is now available for a one-time license fee of $600, Weeks said from 23716 Twenty Mile Road, Olivet, Mich. 49076.

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'CAP' Aids Builders With Datapoints

FALL RIVER, Mass. – The general ledger is the heart of the Construction Accounting Package (CAP) recently announced for Datapoint Corp. computer systems from Bristol Information Systems, Inc. (BIS).

Operating in a conversational, transaction-oriented mode, CAP is said to be a fully integrated system handling all payroll, accounts payable and ledger processing. More than 50 reports provide management with cost, budget and "profit-and-loss" analysis for any number of independent projects and subprojects, BIS said.

The system can also be extended through the use of separately priced billing and accounts receivable and fixed-asset accounting options and a set of modules to put the whole system on a time-shared basis under Datashare, the company said.

The projects can be integrated into the master ledger for each corporation or division. Divisions and corporations can also be consolidated in any configuration horizontally or vertically, the vendor added.

Outputs Labor Distribution

The payroll system, besides doing all the classic calculations, outputs full labor distribution for each employee to as many accounts and projects as needed. The system then posts each transaction to the correct account and ledger.

The accounts payable system spreads each invoice to as many accounts or projects as needed before paying it. Multiple companies with multiple projects can be posted, and cash flow and due date analysis aid management in day-to-day operations, according to BIS.

The ledger system itself supports budget vs. actual comparisons and an audit trail of all entries by source and account number. A report generator makes data accessible in user-specified formats, the vendor added.

The system runs on any Datapoint 1100, 2200 or 5500 running under Datapoint's DOS and having a 132-position printer. The package in object code costs $5,250 and can be ordered from BIS at P.O. Box 2133, Fall River, Mass. 02722.

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Confab to Consider Compliance

PONTE VEDRA BEACH, Fla. – A meeting of the Magen User Group (International), planned for the Ponte Vedra Club here Aug. 8-12, will provide four days of technical sessions for mathematical programmers, according to the conference sponsor, Haverly Systems of Denville, N.J.

The symposium will include a session aimed at formation of a work group with the goal of using the computer to help organizations comply with government regulations of all sorts without devoting excess resources to the compliance effort.

On the other end of the scale, the agenda also includes special interest sessions for the petroleum and petrochemical industry and for the forest products industry, a Haverly spokesman noted.

Other sessions will be on distributed planning and on management and training, he said. There will also be a special tutorial on the use of operations research as a tactical weapon for business planning, he added.

The symposium registration fee is $100 and hotel accommodations – American Plan – at the club are an additional $244, Haverly said from 78 Broadway, Denville, N.J. 07834.

3270 CRT Replaces 1052 As Console Under DOS/RS

SCHILLER PARK, Ill. – Support for an IBM 3270 CRT instead of a 1052 typewriter as the console for a 360/370 is one of the enhancements built into Release 6.4 of DOS/RS now available from Dearborn Computer Leasing Co., according to a spokesman.

DOS/RS was designed as a replacement for IBM's DOS. In its fullest implementation it supports up to three batch partitions and three special partition sections for ongoing tasks such as spooling and teleprocessing on CPUs with at least 128K bytes of memory.

Proprietary spooling software, as well as coding to interface with most commercially available teleprocessing monitors, are built into the DOS/RS package, the spokesman added. Support for inter-partition scheduling and resident directories and transients are also in place, he said.

Additional Features

Release 6.4 includes a feature that permits coupling two CPUs sharing the systems pack and other data files and a new cataloged procedures facility that is said to replace the source library inclusion feature in IBM's Power spooler.

Beyond that, DOS/RS now supports a generic ASSIGN facility to select recording density for tape files and a converter program "that helps take advantage of improved JCL capabilities under DOS/RS," Dearborn claimed.

Although originally developed to support Dearborn's leasing business, DOS/RS is "very definitely" available to installations that already have equipment, but are seeking control software better than IBM's, the spokesman emphasized.

Release 6.4 can be installed under a permanent license agreement for $12,500 or leased for $400/mo on a 36-month plan, the company said from 4849 N. Scott St., Schiller Park, Ill. 60176.

Multiprogramming Backed By Bunker Ramo Software

TRUMBULL, Conn. – Bunker Ramo Corp. has introduced software for the company's Bank Control Systems 90, an on-line teller terminal system now being installed at user sites.

The software includes an operating system, applications programs, IBM 3270 compatibility and customer programmability, the company said.

The Bank Operating System (BOS) is an on-line multiprogrammed system for the System Programmable Control Unit (PCU). It supports reentrant code and dynamic priority assignment based on processing need, a spokesman added.

The Program Support Package (PSP) resides in the user's host computer and is provided to simplify programming of the System 90 PCU. This part of the package is said to include a "comprehensive" cross-assembler, a librarian and linkage facilities, in addition to a loader for the PCU.

Bank Transaction Package (Banktran) is the 3270-compatible applications subsystem of the System 90 software. Individual bank variability such as transaction sequences, CRT display masks, journal data and validation formats are handled by Banktran, the spokesman explained.

Banktran can be used to selectively enable and disable appropriate keys at the System 90 terminal. The system also protects specified fields in the CRT display mask used to guide the teller and accepts only appropriate data in the sequence desired, Bunker Ramo said.

With Banktran, if the host communication link is inoperative, transaction data can be logged to an optional System 90 disk drive for later automatic reentry when the system resumes on-line operations.

At any time, a teller may request his cash position, a listing of as many as 15 totals or an itemized list of transactions that make up any total.

Bunker Ramo's Information Systems Division is at 35 Nutmeg Drive, Trumbull, Conn. 06609.

Datasystems Used for CPM Work

AMES, Iowa – The Critical Path Management (CPM) Reporting/Charting System from Compas, Inc. was designed for builders, contractors, job shops and others who need close control over job scheduling, the vendor said.

Implemented on Digital Equipment Corp. Datasystems equipment, the software is said to accommodate 999 activities and to calculate earliest start and end times, latest starts and ends and total and free floats.

In addition to computation of optimized job schedules, the package supports the printing of scheduling charts "suitable for wall mounting," the spokesman remarked. This output may be a complete rundown of a job or a partial listing by type of activity or time period within the job's total duration, he added.

The software runs on hardware as small as a Datasystem 310 with 8K main memory, two floppy disks and "any" printer available from DEC, Compas said from 413 Kellogg Ave., P.O. Box 687, Ames, Iowa 50010.

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Cobol Proposal Aimed at Formalities

By Alvis Zuntaks
Special to Computerworld

"New Verb or PERFORM Change Proposed" by Patrick V. Reese and Susan J. LeVine [CW, June 7] once again showed the preoccupation of structured programming proponents with formalities rather than substance.

The coding of dummy paragraphs appears wasteful and I also dislike unnecessary coding. But I am willing to code even two dummy paragraphs because the use of the PERFORM paragraph name without the THRU option is much more objectionable.

During the lifetime of a program, many' paragraphs tend to grow into·more than one, specially since there is a new and worthwhile use of the GOTO statement – to break up overgrown, unmaintainable IF statements.

By looking at the example presented in the Reese/LeVine article, the following observations can be made:

- It is commendable to use the previously obtained actual table size IDX2.
- By using nonstructured programming, however, the example can simply be written MOVE IDX2 TO IDX1.
- Assuming a proper search argument is used and that, at the completion of the PERFORM, IDX1 is +1, what happened? Well, it may have found an equal in the table, but then it may not.

A more reliable version of the example would be:

```
    PERFORM DUMMY THRU DUMMY-EXIT
      VARYING IDX1 FROM IDX2 BY -1
      UNTIL IDX1 < +1 OR
      TABLE-ENTRY (IDX1) = SEARCH-ARG.
    .
    .
    .
DUMMY.
    EXIT.
DUMMY-EXIT.
    EXIT.
```

The suggestion of the VARY verb or NULL instead of paragraph name seems appealing, but it would result in the increase of the list of reserved words, which is a plague to the maintenance of previously written programs.

Zuntaks is with Versa Management Systems Ltd. of Toronto, Canada.

RPG-II Course Available

CANOGA PARK, Calif. – An audiotape and workbook training package from Informatics, Inc.'s Group/3 Division, *RPG-II Techniques of Programming (RPG/TOP)* provides a general introduction to the language.

Average time required to complete the $150 course is about 16 hours, the vendor said.

Group/3 is at 21050 Vanowen St., Canoga Park, Calif. 91304.

SEARCH Approach Called Better

By T. Jeff Byrum
Special to Computerworld

The function in Cobol that Reese and LeVine are actually seeking [CW, June 7] is neither PERFORM nor VARY, but actually SEARCH. The clause "BY -1" in their example causes a simple serial search of TABLE-ENTRY, only in reverse order.

Searching in ascending order would be simple with the ANS Cobol SEARCH verb. If logical considerations require searching the elements in the sequence indicated, then storing the table in reverse order and using SEARCH would solve the problem.

However, assuming that some problems might actually require a reverse order serial search, why add a new verb and a new reserved word to the language? I propose adding a new SEARCH facility with an existing reserved word:

```
SET IDX1 TO IDX2.
  SEARCH REVERSED TABLE-ENTRY
    AT END
      MOVE '1' TO NOT-FOUND
    WHEN TABLE-ENTRY (IDX1) = TABLE-
    ENTRY (IDX2)
      NEXT SENTENCE
```

Byrum is assistant systems officer at Bankers Trust Co. in New York City.

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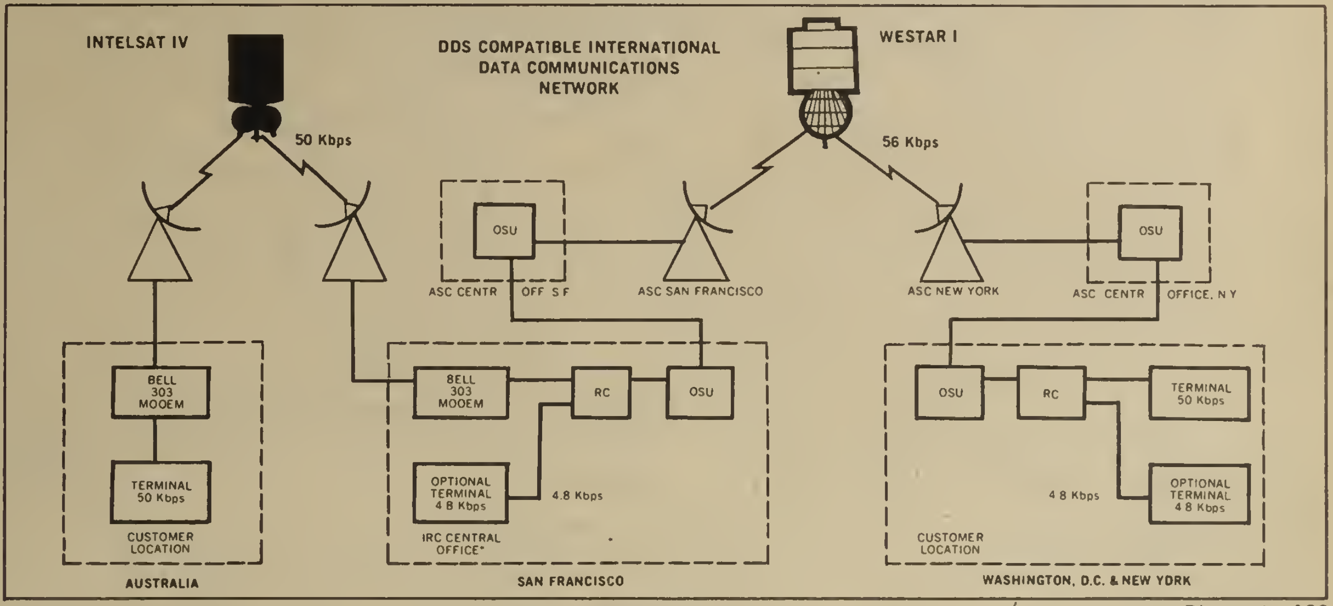

Link for Nasa

Diagram by ASC

By Ronald A. Frank
Of the CW Staff

GREENBELT, Md. – The National Aeronautics and Space Administration (Nasa) has configured an international two-hop satellite circuit that combines 50 kbit/sec and 56 kbit/sec facilities in the same link.

The international link connects the Goddard Space Flight Center here with a Nasa site in Australia. The link combines both digital and analog facilities and uses terrestrial synchronous as well as satellite asynchronous circuits to complete the data transmissions.

The major portion of the satellite link is handled by American Satellite Corp. (ASC) for Nasa. Most of the data on the link is routed from Australia to Goddard and is used to obtain readout data from various Nasa satellites and to send command signals to both earth-orbiting spacecraft and space-probe vehicles.

Although the application is much more complex than the average user would need, the configuration of the international link over two satellites could apply to any international user, ASC said. Another similar link will soon be configured for a transatlantic business user, an ASC spokesman said.

From Australia data is transmitted out of a Univac 642B CPU to a Bell 303 data set. From there the data is transmitted by the Australian Telecommunications Commission via terrestrial facilities to a Comsat General Corp. earth station and up to the Pacific Intelsat IV satellite which provides a 50 kbit/sec circuit.

The data is received at a Comsat earth station in California and routed over an RCA link to the ASC central office.

Data from the satellite is received in analog format at 50 kbit/sec, sent through a Bell 303 data set and then through a special one-port multiplexer "rate converter" which makes the transmission coming in at 50 kbit/sec compatible with the 56 kbit/sec transmission rate used by ASC on the Westar I satellite.

'Elastic Buffer' Used

The speed translation is accomplished with an "elastic buffer" which holds 1K bits and can compensate for a number of factors including varying propagation delays of the satellites, according to an ASC spokesman.

The signal coming out of the rate converter at 56 kbit/sec is sent through an AT&T Data Service Unit (DSU) and onto a Dataphone Digital Service (DDS) circuit between the RCA office and the ASC terminal on the West Coast.

At the ASC site, the signal is passed through another DSU and converted from digital form back to analog for transmission to the ASC earth station.

The signal is transmitted over Westar by ASC at 56 kbit/sec to an ASC earth station on the East Coast. From there the data is sent to an ASC central office where it is converted from analog to digital form through a DSU.

Using another DDS circuit, the data is sent to Goddard and into a second DSU and then through a second synchronous rate converter.

The converter also breaks down the 56 kbit/sec DDS synchronous timing into a 50 kbit/sec rate used for the Intelsat transmission. The converter utilizes bit-stuffing techniques for the speed translation process, an ASC spokesman said. The satellite transmissions are basically asynchronous while the DDS circuits use synchronous timing from a master network clock, he said.

After passing through the converter, the data is received by a Univac 494 CPU at Goddard. The entire link provides the user with a transparent data path and all timing is synchronized with the DDS clocking on both the domestic and overseas portions of the link, ASC said.

Nasa has been using the two-hop satellite link since last March with few problems. Data is transmitted in a packet-switched mode developed by Nasa, according to a spokesman.

There are no problems caused by propagation delays since most of the traffic is transmitted one way in batch mode. The packet protocol used by Nasa is not compatible with other packet transmission methods, the Nasa spokesman said.

Since most of the transmissions are one way at a time in batch mode, there were no software problems as might have been encountered over an interactive transmission pattern over a satellite circuit, the Nasa spokesman said.

The packet-switched messages do have error-detection procedures, but no error-correction procedures. If an error is detected in a packet block, the packet is flagged and it can either be retransmitted or it can be omitted from the overall data as required. Since spacecraft tracking data is often highly redundant, it is possible to disregard error packets in certain cases, the Nasa spokesman said.

Network Enhances Control of Divisions

By John P. Hebert
Of the CW Staff

DAYTON, Ohio – A large restaurant chain is installing a point-of-sale (POS) terminal communications network to bring its corporate computer processing power and services "full circle."

Ponderosa System, Inc., which operates and licenses over 500 steak house restaurants, has 33 NCR Model 250 intelligent terminals in place, according to Ray Florence, the firm's director of management information systems (MIS).

Ponderosa plans to have 103 of these 16K-bit terminals installed and communicating by next February and hopes to have from 350 to 400 terminals up by the same time in 1978, Florence said.

There are two reasons for the prolonged installation processs, he said. The first is monetary: "The terminals are expensive units" considering how many the chain is installing.

Secondly, "it's a matter of logistics. We've instituted a POS field manager to train employees – We don't want to flood the restaurant sites without adequate training," he said.

Six Months Planning

Six months of work went into the planning of the network, in an effort to "close the entire circle" of restaurants, Ponderosa's meat plant and corporate headquarters.

"We [at headquarters] were kind of a separate entity and divisions acted on their own," Forence said, noting management lacked information at all company levels.

With the terminal network, the circle will be closed, and the business will be under the complete control of headquarters. The network also will be justified in monetary terms because of the improved controls, timely information and "all the standard reasons" for installing such a system, he explained.

Each terminal will be tied through a Wats line network to an IBM System 7 CPU here acting as a front-end processor for a 750K-byte IBM 370/145; The System 7 will have direct channel attachment to the 370/145, he added.

The terminals will be polled at night, from about 12 midnight to around 3 a.m., across three time zones in what Florence called a novel polling approach.

Polling will be done by the front-end processor through six automatic calling units – one for each Wats line – able to dial the stores without an operator, Florence said.

Bell 200 Series modems at corporate headquarters will relay the query at 1,200 bit/sec and terminals will be polled directly from core memories, Florence said.

Pioneering Method

Florence thinks Ponderosa is "a pioneer in this polling method."

Polling directly from terminal core, however, will eliminate Ponderosa's ability to access the information held there during the working day without permanently extracting it, he noted.

When the network finally goes operational in August or September, the restaurant chain will know if there are any problems. At present, no terminals have been polled, Florence said.

Once the first terminal is polled in late summer, Ponderosa will just have to add telephone numbers to the front-end machine because the network will be standardized, he said.

Florence expects the polling operation to take about 3.3 hours for 400 terminals assuming a worst-case call completion time of three minutes. In actuality, the polling process for each terminal should take about 1-1/2 minutes, he added.

Three Phases

The information polled will be handled in three phases, Florence said. First, all the restaurants' financial data and product mix information will be sent for the use of the company's marketing groups.

After that phase has been successfully implemented, payroll data will be added to the financial data.

The third phase will include accounts payable, inventory and automatic recording data sent over Ponderosa's communications facilities, Florence said.

If there are any malfunctions at the store level, he said, NCR will have to handle those problems because that end of the network is "100% NCR equipment" including a 1,200 bit/sec modem incorporated in the terminal.

While Ponderosa waits for the first terminal to be polled, the company is making use of the units at the store level, where they have helped reduce paperwork and accounting requirements, he said.

9,600 Bit/Sec Modem Available

WHEELING, Ill. – Gandalf Data Communications Ltd. has brought out the LDS 120 modem which is said to be suitable for all speeds of asynchronous data transmission up to 9,600 bit/sec on half- or full-duplex wire circuits.

The LDS 120's modulation scheme does not require DC continuity, the company said, adding transmission signal levels are in accordance with Bell Publication 43401.

At 9,600 bit/sec over 26-guage-wire, the modem will transmit data up to 5.5 miles. Other features include controlled carrier for multidrop mode of operation with separate light-emitting diodes for Power and Receive Carrier indications.

The LDS 120 costs $300, Gandalf U.S. operations spokesman said from 190 Shepard Ave., Wheeling, Ill. 60090.

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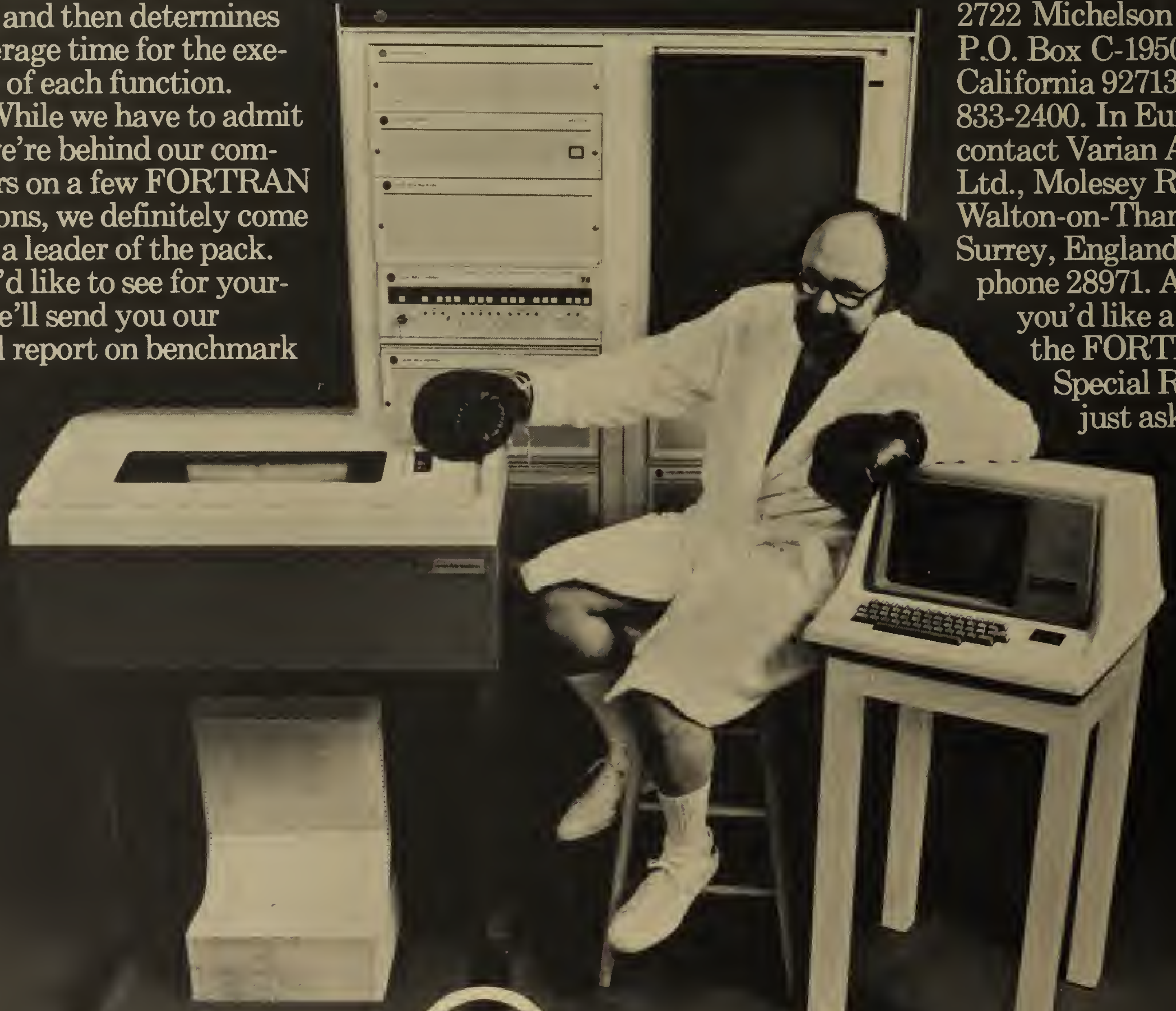

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Helping a Fast World Move Faster

Lear Siegler Upgrades ADM-1, Gives ADM-3 Full Cursor Ability

ANAHEIM, Calif. – Lear Sigler, Inc. has introduced an upgraded version of its ADM-1 terminal and made modifications to the ADM-3 terminal.

The ADM-1A, designed to simplify data entry, features an expanded solid-state keyboard with both numeric pad and lower-case Ascii alphabetic characters.

The numeric pad has a period, comma and plus and minus signs along with a 138-character keyboard that contains punctuation and control keys, a spokesman said.

The terminal's numeric pad is positioned adjacent to and immediately to the right of the standard keyboard to afford natural operator hand movement and facilitate numeric data entry, the company said.

Additional features include a display of 960 characters in a 5 by 7 dot matrix arranged in an 80-char./line by 12-line format with optional placement of 1,920 characters in 24 lines.

The basic ADM-1A is priced at $1,850 with a 30-day delivery.

ADM-3 Operation Expanded

In addition, the company has added a capability for full-screen cursor operations to facilitate modification of displayed input and output data on the ADM-3 "dumb terminal."

Augmented cursor operation of the ADM-3A includes both keyboard and direct computer control, with full range of cursor movement across the video display terminal's screen, according to the company spokesman.

This feature adds $50 to the terminal's basic $995 price, he said, adding the cursor control cannot be retrofitted to earlier models. Models equipped for full cursor control are designated ADM-3A, the company said.

The second character set has 64 Ascii characters displayed as upper case, plus punctuation and control. The keyboard mounts 59 alphanumeric keys plus teletypewriter control keys, Lear Siegler said from 714 North Brookhurst St., Anaheim, Calif. 92803.

Synchronous Modem Extends GDC LSI Line

WILTON, Conn. – General Datacomm Industries, Inc. (GDC) has added the GDC 201-7 to its line of LSI synchronous modems.

The 201-7 features 2,400 bit/sec private-line operation, Bell 201B and 201C compatibility, optional remote diagnostics for point-to-point or multipoint applications, four-wire dial backup, complete loopback capabilities and modem self-test, GDC said.

The GDC 201-7 was designed to operate over unconditioned four-wire types of private lines. Four-wire dial backup is provided for operation over the dial-up network via a pair of Bell Manual Data Couplers (CDT 1000A).

Available as a stand-alone modem for remote locations, the 201-7 incorporates diagnostic functions which permit local verification of modem and system operation without the need for special tools or test equipment, the firm said.

The unit costs $875 with delivery in 30 days from 131 Danbury Road, Wilton, Conn. 06897.

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Data Briefs

Beehive Designs Terminal For Users on Budgets

SALT LAKE CITY, Utah – Beehive Medical Electronics, Inc.'s Beehive Terminals has introduced the B100, a remote video display terminal designed to accommodate users with budgetary limitations.

The B100 is self-contained, operator/computer accessible terminal featuring switch-selectable transmission rates from 110 bit/sec to 19.2 kbit/sec, cursor control, RS-232C or current loop interface, addressable cursor, erase mode and a hard-copy capability with printer interface.

Expansion options, such as formatting, editing, blink and 16 function keys, are available, Beehive said.

The terminal employs a 12-in., digital-type monitor which is formatted to display 12 or optional 24 lines with 80 char./line. Upper- and lower-case characters are optional.

The B100, which has a total page memory of 960 characters or optional 1,920 characters, costs $1,495. Beehive is at 870 W. 2600 South, Box 25668, Salt Lake City, Utah 84125.

Unit Offers Dial-Up, TWX

SANTA ANA, Calif. – Info Products International (IPI) has introduced the Quad/Mode data communications terminal with both dial-up and TWX capability and four transmission modes.

The terminal is based on a modified General Electric Corp. Terminet 30 teleprinter, the company said.

The Quad/Mode has dial-up capability for time-sharing terminals through Direct Distance Dial (DDD) telephone lines at switch-selectable transmission speeds of 10-, 20- or 30 char./sec; access to the TWX network; direct hookup for a local computer communications front end; and an alternate model access to the TWX/DDD networks through a special modem with an RS-232C interface, IPI said.

The unit is also said to offer 80 or 132 print positions, single or dual magnetic tape cassettes, 1,200 bit/sec transmission, automatic answering and originate/answer capabilities and rotary or Touch-Tone dialing.

The Quad/Mode terminal carries a purchase price of $2,509; the Quad/Mode TWX/DDD modem may be purchased separately for use with other terminals, IPI said from Suite 1, 1241 E. Chestnut St., Santa Ana, Calif. 92701.

NCR Adds Modular Matrix Printer

DAYTON, Ohio – A modular matrix line printer designed to operate in a variety of communications environments has been announced by NCR Corp.

The NCR 6440 offers a variety of interface kits and options, NCR said. This reportedly allows users wide latitude in tailoring a remote, multicopy printer to their specific needs.

The tabletop printer can print an original plus one to four copies at a speed of 173 char./sec. Designed for use with NCR Century mainframes and minicomputers in a communications environment, the printer can also be used as a "slave" printer with the NCR 796 visual display terminal or as a stand-alone remote or in-house unit, NCR said.

Purchase price for the printer is $2,575. Monthly rental is $90. Purchase prices for the eight interface kits range from $825 to $3,175; equivalent rental prices range from $30/mo to $105/mo.

The printer will be available for customer delivery in the fourth quarter, NCR said.

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Decision Made on Three Criteria

NCSS Puts Amdahl 470 on IBM 370-Based Network

By Toni Wiseman
Of the CW Staff

STAMFORD, Conn. – There were three primary criteria which proved positive and encouraged National CSS, Inc. (NCSS) to add an Amdahl Corp. 470V/6 to its network – price/performance, diagnostic abilities and ease of installation.

At the time the decision was made to acquire a new computer, NCSS East Coast data center had an IBM 370/158 and a 370/168, and it was running out of capacity faster than expected because of an extremely good business year, according to Michael S. Field, vice-president of data systems for NCSS.

Its options were to add another 370/158 or to upgrade the 370/158 it had to either a 370/168 or an Amdahl system, he said.

"We'd been looking at Amdahl for about 12 months. We'd done some benchmarks in its Sunnyvale center and had some conversations with [the University of] Michigan and spoken to others about their experience, primarily Mass. Mutual Life Insurance Co.," Field said.

"As a result of our findings it seemed like [the acquisition of the Amdahl machine] was a reasonable business decision for us to make in terms of the kinds of improvement we expected to see within the 1.5 to 1.6 range, or 50% to 60% more throughput," he said.

NCSS has its own operating system, VP/CSS, which is of the same parentage as VM, Field said. It consists of two parts – the virtual control program or VP and its conversational software system or CSS.

VP is a 'virtual machine' control program that shares the resources of the hardware system among the tasks running on the system, which may involve time-sharing information, retrieval, batch processing, and other operating systems or remote batch.

Ran Benchmarks

At Sunnyvale, NCSS ran benchmarks where it "fired up more and more users to see how the system handled itself and measured its throughput," Field said.

Since the only machine available for tests was a 2M-byte system, it was forced to run a number of tests, extrapolate the results and project what the results would be with a full configuration.

"We're looking at a 6M-byte system when fully configured," Field said. "That's what we feel is a good balance for our operating system, between the memory size and the CPU power."

NCSS can run up to 250 users simultaneously on its 370/168. Based on the benchmarks, it feels the Amdahl machine should accommodate "50% as many as the 168, conservatively in the 350-plus area," he said.

Remarking on the three primary criteria which led to the selection of the 470V/6, Field said NCSS expected to achieve somewhere approaching a 2:1 ratio in terms of price/performance over the 370/168, where the cost of the Amdahl system was approximately 20% less than the 168, and the projected performance was 60% more.

"Even if we were being optimistic and 2:1 is better than we're going to get, even approaching that number is attractive to us," he said.

The 470V/6 costs in excess of $4.25 million, of which approximately 75% will be on a long-term debt basis and the balance paid from general funds.

Field also praised Amdahl's diagnostic abilities which, he said, were necessary for their time-sharing applications.

In addition, the Amdahl machine was slated for installation in a new facility.

"It would have been quite expensive in terms of fitting it up for cool water for the 168," he said, "but the Amdahl is air cooled and doesn't need it."

"It's also a more easily maneuverable and installable machine. The thing was installed in 12 hours compared with one to two weeks for a 168," he said.

"We didn't speak to anyone who had any reservations about their [Amdahl] system," Field said.

"I think Michigan did have a couple of problems right at the beginning, a channel problem which bugged them for a while. But that was the only negative comment we heard, and people at Michigan spoke about it in a positive way because they were impressed by the way Amdahl handled it," he said.

NCSS took the 470V/6 for an acceptance test in May and "submitted it to as many different loads and as heavy a load as we possibly could to exercise it both from the performance and reliability standpoints, just to see if it met our expectations," Field said.

The results were so satisfactory NCSS moved up the date for putting its customers on the system from June 15 to June 1.

"For the first two weeks we didn't see one hardware hit during prime time, which was remarkable for a new machine," Field said, "and since that time we've had maybe one or two hits, but nothing dramatic."

NCSS is not worried about Amdahl's viability as a hardware manufacturer, although it was an important consideration at one time, Field said.

In addition, NCSS, as well as others, have a backup agreement with the Fujitsu organization, in the event Amdahl itself could not provide maintenance services, he noted.

Auditor's Ante in DP Systems Seen High

By Don Leavitt
Of the CW Staff

MONTREAL – The widespread use of computers for processing accounting and other business information has had a "significant impact" on the specific measures used to achieve adequate control, according to Paul R. Smail, manager in the headquarters organization of Arthur Andersen & Co.'s Administrative Services Division.

Addressing a technical session at the recent Common meeting here, Smail noted, however, that "basic elements that must exist" in an adequate system of internal control are unaffected by the DP method used.

Those elements include a plan of organization which provides appropriate segregation of functional responsibilities and a system of authorization and record procedures adequate to provide reasonable accounting control over assets, liabilities, revenues and expenses, he said.

But sound practices to be followed in the performance of duties and responsibilities of each department, and personnel of a quality commensurate with their responsibilities, are also among those basic elements, Smail stressed.

Compensating Controls Needed

With computers, "new controls are necessary" since "many functions which were formerly dispersed throughout several departments are now performed by people and machines in a single department," Smail said.

This means, he went on, many control measures which are based on human judgment or division of duties simply are no longer available. Without compensating controls, the auditor considers the computer a "device that lets us process data, in an erroneous manner, without human intervention, at the speed of light."

Specifically, Smail said, the auditor may be stymied because "in most situations the computer plays a major role in compiling the account balances he is auditing." Beyond that, "much of the detail backing up these balances is on computer files, readable only through the eyes of the computer."

In addition, "this data is basically manipulated by the computer with no permanent record of what was done, and the logic of the processing itself is essentially invisible to the auditor," he continued.

"You can appreciate that this is a sobering prospect for a man who puts his professional reputation, his livelihood and his personal assets on the line when he says the financial statements produced by this process 'present fairly' [the company's financial position]," he added.

On the other hand, he went on more optimistically, "the speed of the computer and it ability to perform logical and arithmetical operations present significant possibilities, not practical in a manual system, for providing better internal control."

Auditor's Expectations

Since the auditor sees both good and bad arising from heavy use of a computer, there are several things he would like to find in his review of internal controls in a DP system, Smail said.

If a company looks to the auditor only for his opinion on financial statements, the review will probably be limited to those controls which ensure the accuracy of the ledgers, reports and other products of the system.

In that case, Smail said, the auditor will want to know what controls exist to ensure that all transactions are properly recorded on source documents, that all source documents are transmitted to the data center and that the transcription of the documents to machine-readable language is done accurately.

All transactions should be entered into the computer system, but only once; the transactions must be processed properly through the various programs that make up the DP system; and the ledgers, reports and other output must be properly prepared, Smail added.

Even if the auditor's role is defined that narrowly, the speaker continued, the auditor will have to acquire a certain background to increase his understanding of the process. He will have to know, for example, the type of equipment used, the organization of the systems development and operations functions and the degree of involvement of the company's own internal auditors in developing and testing system controls.

If the company's management takes a broader view of the auditor's responsibilities, Smail said, his review of controls will also be broadened to include those measures in effect to prevent improper use of the system and to ensure its continued availability in an unimpaired condition.

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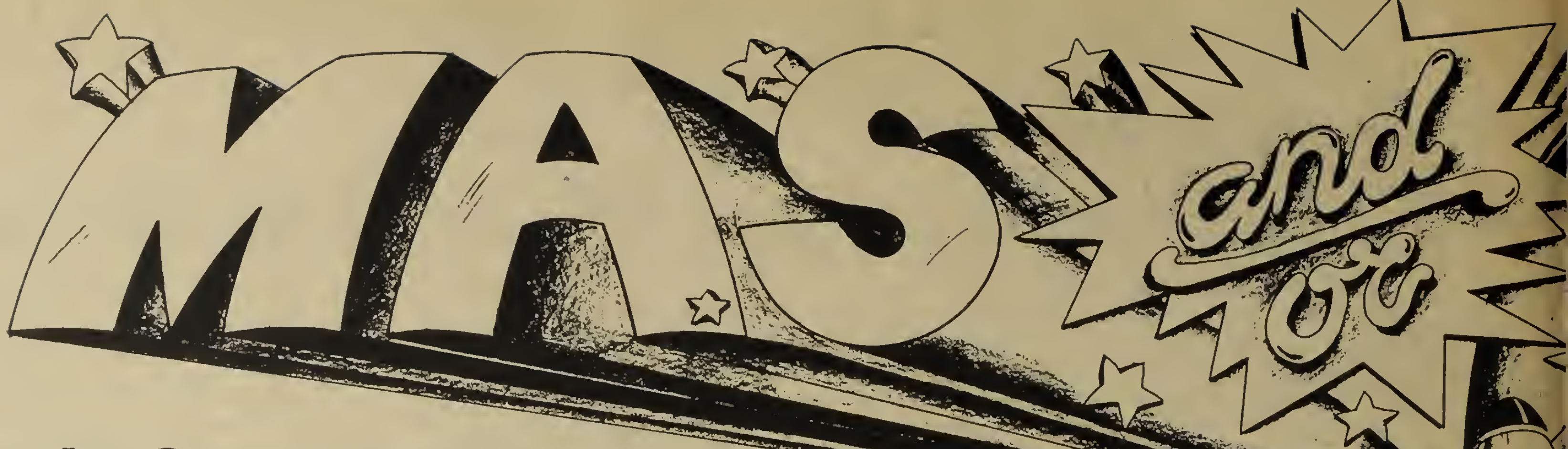
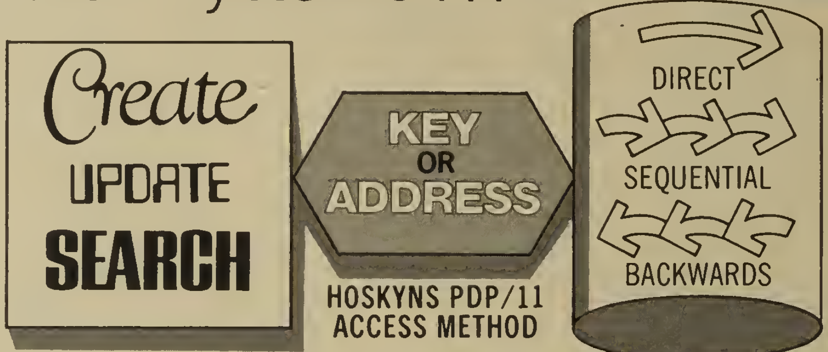


We **Build** Computer Systems . . .

We build, or help build, computer systems. At one exteme we take full project responsibility: at the other, we provide a programmer or analyst—on a daily basis—to augment your team. However we fit in, we all work in a systematic manner. We use leverage tools. And we try **to make things a little better**. For example, our Hoskyns Access Method for Digital Equipment Corporation's PDP/11 Series is a superior indexed sequential data base facility.



HOSKYNS PDP/11 ACCESS METHOD

. . . from Original Designs . . .

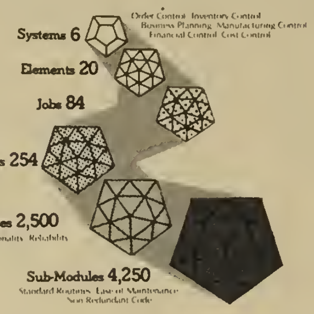
We build custom systems from client specifications or including design. At $4 to $6 per COBOL statement (versus a $6 to $10 in-house average), we may not save all that much money. But we do provide schedule flexibility, specialist skills and **assured results in demanding situations**. The system sketched in the box (we carried full project and technical responsibility) illustrates our capability.

TWIN BURROUGHS B6700's

- 50,000 messages per hour
- 800 terminals
- 4.5 billion characters on-line
- 24 hour service

. . . or Using MAS Modules.

We build custom systems and we build systems based on our off-the-shelf Modular Application Systems (MAS) modules. Either way, the systems come out **exactly to your specification**.


Systems 6
Order Control Inventory Control
Business Planning Manufacturing Control
Financial Control Cost Control
Elements 20
Jobs 84
Programs 254
Modules 2,500
Commonality Reliability
Sub-Modules 4,250
Standard Routines Ease of Maintenance
Non Redundant Code

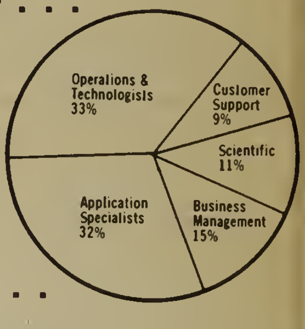
You Get a Quality Job . . .

However we build the systems, our approach is careful and conscientious. We work to fixed price, performance and delivery contracts. We provide a free maintenance period. We design robust systems **to produce results** in the real world.

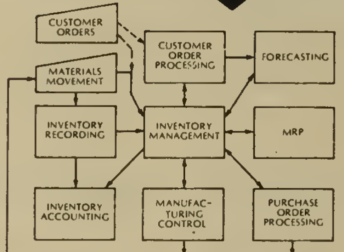
SYSTEM CHARACTERISTICS	PROGRAM ATTRIBUTES	MMDS TOOLS
Convenient Input/Ouput Operability/Recovery Audit Trail/Error Control	Testing Implementation Alteration	Systems Analysis Language Decision Table Processor Modular Programming Test Harness

You Get Responsible People . . .

Our people are responsible professionals. Our approach is a modest, cautious one: a systematic method, use of leverage tools and a **respect for individual ability**. As a company, we provide well thought out products and services in a reliable and economic way. We now have 1200 staff members and sales in excess of $40M p.a.



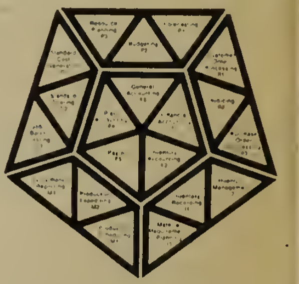
You Get MAS Integration . . .

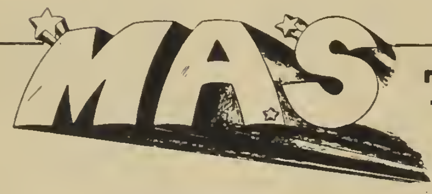


MAS offers meticulous fit, immaculate finish and demonstrable performance at miniscule cost. If that's not enough, MAS allows you to build a **totally integrated system**: piece by piece, in any sequence, with the certainty that it will all fit together. Take the MAS Inventory Control links.

And You Get MAS on RJE

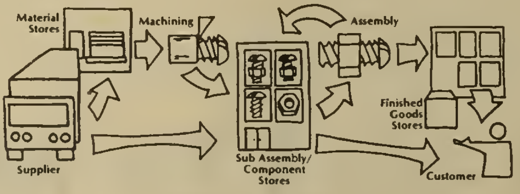
If you need computer power as well as computer systems, MAS on RJE is a five star service. The **MAS systems cost you nothing** through one of our RJE terminals installed in your office. You pay only for set-up, and any tailoring or implementation you may elect to have done. That's it. At no cost you have unrestricted access to the complete range of MAS systems. The RJE running charges are modest.





Tailored Fit . . .

Where MAS can be used, you get a system to your exact specification with a finish better than custom. Only by spreading the cost of detailing over many users can such refinement be afforded. And **MAS fits better than custom**. Take inventory control as an example. MAS models the complete inventory situation: resources and movements. Because it accurately reflects the real situation, it can always be tailored to fit individual requirements. And, because it's built to flex, MAS continues to fit your developing needs:



$1 per Program Statement . . .

With COBOL code averaging $6 to $10 per line, MAS costs less than $1 per immaculate statement—standard. **Tailored to include special facilities**, it isn't likely to reach $2 per line. The $6/$10 norm? As follows:

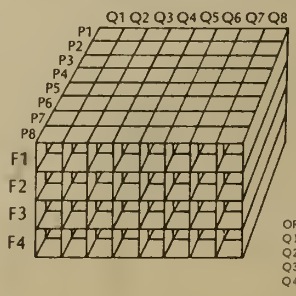
	High	High	Low	Low
Cost/ Man Month*	$2.400	$4.000	$1.440	$2.400
Statements/ Man Month	240	400	240	400
$'s/ Line	$ 10	$ 10	$ 6	$ 6

*Includes Fringes, Training, Machine Time

ORDER POINT
P1 Calculated From Service Level
P2 Calculated From Safety Factor
P3 Calculated From Safety Period
P4 Out Of Stock
P5 Back Order
P6 Fixed Quantity
P7 Individual Period
P8 Intermittent Period

FORECASTING
F1 Single Level Exponential
F2 Exponential Plus Trend Correction
F3 Statistical Plus Management Supplements
F4 Manual

Note: All of above may be order or usage based; and include consistency and responsiveness checking.



Proven Performance . . .

Over 550 MAS systems are now in use—worldwide. You can see them working, study the documentation and **see the results produced**. So you know that there's no risk and the performance is proven. And you'll appreciate the refinement that comes with experience. For example, the MAS Inventory Control System provides a complete spectrum of inventory policies.

ORDER QUANTITY
Q1 Economic Batch Quantity
Q2 Part Period Balancing
Q3 Discrete Orders
Q4 Fixed Quantity
Q5 Jobbing Orders
Q6 Discrete Period Cover
Q7 Multiple Period Cover
Q8 Replenishment

We Also **Run** Computer Systems . . .

We run systems for clients: as a **supplement** to the use of in-house facilities, as an **alternative** to acquiring a new computer, or as a **replacement** for an old one. Client facilities and our central computers are linked by a nationwide network.

. . . on IBM 370/168 Computers . . .

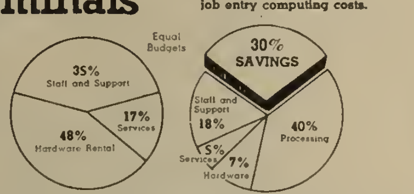
HARDWARE
MAIN FRAMES:
370/168 s 360/50
370/145 CDC 6500
370/155 EAI 8400
DISKS:
2314, 3330 – single and double density
Drums, Magnetic Tapes, Plotters, Microfilm

SOFTWARE
TSO IMS DBOMP
SVS/HASP
OS/MVT/HASP
DOS DOS/VS
Emulation Assembler
COBOL-ANS FORTRAN
PL/I RPG SNOBOL
Application Software
Scientific Software

We use large, **economy of scale**, IBM 370/168 computers at our centers, with smaller IBM computers tied in as satellite stations. You have as much, or as little, local processing power as you wish. Planned overload is floated back to the versatile /168's.

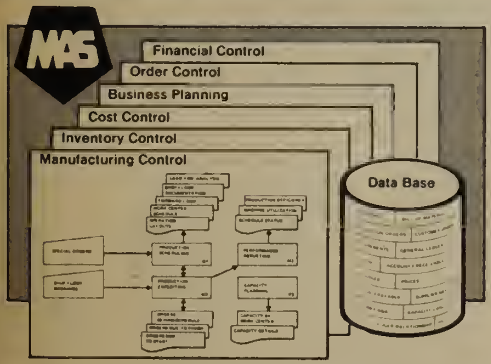
. . . through RJE Terminals in Your Office.

Example of in-house versus remote job entry computing costs.



Most of our clients operate through Remote Job Entry (RJE) terminals installed in their offices. They get all the **convenience, responsiveness and control** of an in-house computer. Card readers, videos and printers (and, maybe local storage and processing power) are handled just as you would an in-house machine. Economy of scale and utilization makes for significant savings.

You Get Data Processing Professionalism . . .



With RJE Computing Power we like to work in a clean, transparent arrangement: it's effectively your own computer. But we know how to produce **systems that perform**, and we know how to manage a data processing activity successfully. So—if you can use our systems expertise, or our data processing methodology and tools—they're yours for the asking.

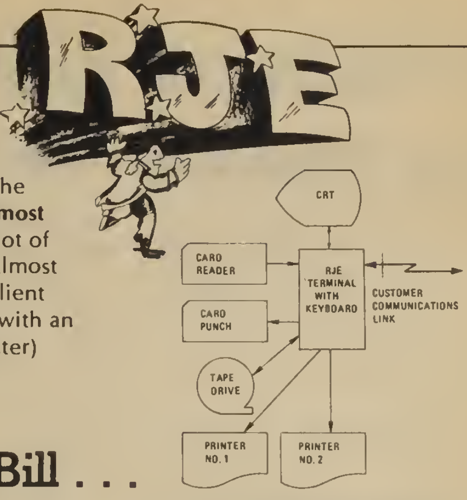
You Get Convenient Computing . . .

You run the RJE terminal just like your own computer. Passwords protect. **Priorities leave you in control.** The flexible configuration expands to handle your loads and contracts, when you don't need it, to save you money. You reach remote subsidiaries. And you have up-to-date software and complete technical backing.

SECURITY	
FIELD	FUNCTION
Password I.D.	Jobs, data sets, libraries, programs
Account #	Protection hierarchy
Accounting I.D.	Cost control
Location	Protection hierarchy

PRIORITY	
CLASS	TIME INTO EXECUTION
I	Interactive
Q	0 minutes-15 minutes
O	15 minutes-1 hour
J	1 hour-4 hours
K	4 hours-12 hours

The Elastic Configuration . . .



If you use an RJE facility, the most noticeable feature is the **almost limitless** power. The /168's do a lot of work in a hurry; and they have almost any capability you'd want. This client replaced an in-house computer with an RJE set-up (adding a second printer) while saving money.

The Shrinking Bill . . .

	BEFORE	AFTER
EQUIPMENT NO. JOBS/WK	360/50 2000	DATA 100 3000
NO. OPERATION SHIFTS	3/DAY, 7 DAYS/WK	2/DAY, 5 DAYS/WK
NO. DAYS TO CLOSE MONTH END	5	2
TOTAL COST	$75K/MONTH	$26K/MONTH

With RJE you **pay only for what you use.** You don't pay for a machine that's used 20 hours on one day per month—and 5 hours every other day. You don't configure your local machine for an extreme job that represents 5% of your load. And you know that every second of machine usage you save will come right off your cost. The economics for the configuration above.

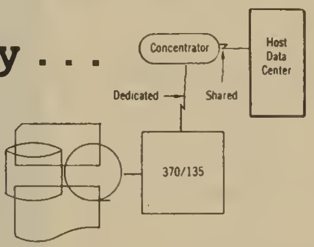
The Technological Umbrella . . .

FREELY AVAILABLE TOOLS

- Systems Development Methodology (SDM)
- Data Specification Language (HSL)
- Decision Table Processor (Tablemaster)
- Modular Programming Test Harness (Testmaster)
- Off-the-shelf Modular Application Systems (MAS)
- Modular In-House Training System (MITS)

With over 50 technical specialists and large-scale equipment we provide a complex VS, TSO, IMS, CRJE environment. This, with the compilers and utilities we offer, gives you a lot of power; and we make sure that the system is fully up-to-date and exercised. On top of that we make available—at no cost—our proprietary **methodology and tools**.

You Get RJE Flexibility . . .



With RJE you get limitless capacity, remarkable savings and state-of-the-art technology. So you're always **right up to date.** You avoid the inertia, the heavy system maintenance burden and the underutilization cost of your own facility. You get the benefit of the super configuration and powerful software. And you can mix-and-match economic local facilities with the central /168 resource (for peak loads, large jobs or special software work).

And You Get MAS on RJE ★ ★★★

If you're looking for systems as well as computer power, MAS on RJE gives you the five star treatment: no cost MAS—with **single supplier, dedicated system convenience**—on resourceful RJE. And our nationwide network links in remote locations. Our regional managers cover the country pretty well in support:

BALTIMORE: Bob Burns (301) 823-1600
NEW YORK: John Bately (212) 541-4740
BUFFALO: Bud Feely (716) 634-8210
ORLANDO: Ellis Tidwell (305) 855-1050
CLEVELAND: Chris Horrocks (216) 331-7755
CHICAGO: Chuck Erickson (312) 298-1247
DENVER: Norwood Robb (303) 761-3781
LOS ANGELES: Dick Condon (213) 328-0660
LONDON: Neville Cerfontyne 242-1951

For More Information on MAS and/or RJE, just return the coupon or—if it's easier—get hold of one of our regional managers (or Dick Nemerson 301/823-1600, 300 East Joppa Road, Baltimore, Maryland 21204). We'll gladly send one of our comprehensive Handbooks by return mail.

Mail to: Dick Nemerson,
MMDS Headquarters,
300 East Joppa Road
Baltimore, Maryland 21204

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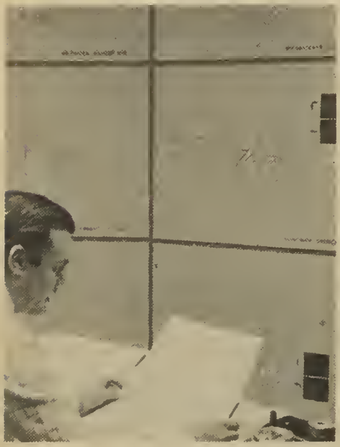
☐ **RJE Handbook** ☐ **Building Systems Handbook**
☐ **MAS on RJE Computing Services Handbook**

Name ____________ Title ____________
Company ____________
Address ____________
City ____________ State ________ Zip ________
Phone (   ) ____________

Pilot System Controls German Traffic By Changing Signs Where Roads Meet

RUSSELSHEIM, W. Germany – Heavy traffic flows along the highway network between Frankfurt, Wiesbaden and Darmstadt, which serves arterial highways from Cologne, Hanover, Munich, Stuttgart and Basle.

Not so unusual – except that a computerized traffic control system has been experimentally implemented for the first time along these supraregional highway routes.



Current traffic situation is shown on wall-size mimic diagram which also indicates the present state of the relief-route signs installed at highway interchanges.

In accordance with Germany's Federal Ministry of Transport, a trial system was set up there to interpret current traffic volume data and operate variable relief-route signs at highway interchanges.

The relief-route signs are changed when a Siemens AG Model 16030 traffic control computer located here finds certain sections of the highway are carrying unequal traffic volumes.

The sign system enables traffic streams to be diverted at two four-way interchanges, Darmstadter Kreuz and Nordwestkreuz Frankfurt, and two three-way interchanges, Russelsheimer Dreieck and Monchhof-Dreieck, to alternative relief routes.

The traffic control system essentially consists of variable relief-route signs posted at highway interchanges, special detectors for the collection of current traffic data, a transmission system and a control center with the Siemens computer.

Detectors embedded in the roadway pavement report to the control center the numbers of vehicles on the road, their speed and whether the vehicles are passenger cars or trucks.

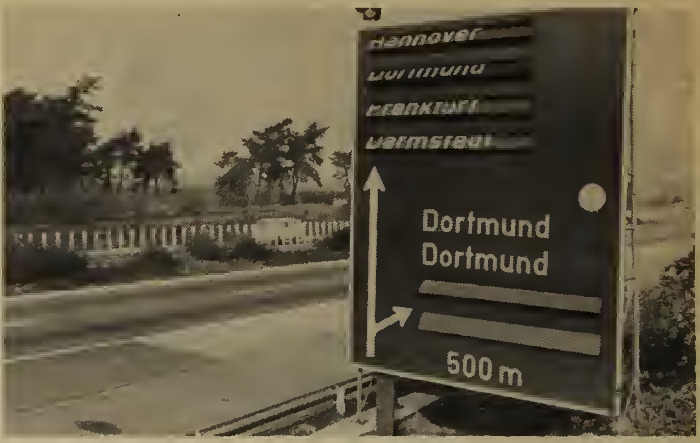
Discriminating between vehicle categories is important in those cases where highway traffic is to be diverted to routes containing uphill gradients.

In the Russelheim highway maintenance depot control center, the computer processes the traffic data and displays it in consolidated form on a video display unit and on a mimic diagram.

When sections of a highway are reported to be carrying excessive traffic volumes, a traffic rerouting program is initiated by changing the variable relief-route signs at the interchanges.

The signs are set up along the highway in sets of two advance signs and one main sign. The signs in a set are not changed simultaneously but consecutively, depending on the average vehicular speed prevailing on the respective section of highway.

This minimizes the number of motorists receiving contradictory rerouting recommendations.



Variable relief-route sign is changed after CPU determines necessity of rerouting motorists.

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–Immediate Delivery–
NCR 128K byte Core Memory
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High Density Disk Drives
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In-House System Gives City Assessors Local Control

PONTIAC, Mich. – An in-house system here is giving this city local control over property assessments.

"Our assessors felt local control was important," Robert D. Chapp, acting management systems administrator for the city, said.

"They didn't believe the assessed value of a piece of property in Pontiac should be under the control of an individual in the county government who might live 40 miles away."

The software system used by Pontiac computes and prints tax bills, assessment rolls, tax rolls, three-year sales studies and has a loss and adjust subsystem.

Initially developed by Oakland County, the system is available to any government body, he said.

The Pontiac DP department is equipped with an NCR Century 200 with 64K, two NCR 657 disk drives, an NCR 686 card reader, five NCR 736 key-to-tape units, three phase-mode tape handlers and a 1,500 line/min printer.

The use of three-year sales studies is a key element in equitable property assessment, according to Chapp.

"We're not interested in the selling price of an individual house," he said. "For example, a few sellers in a neighborhood might get lucky and sell their homes at the highest possible price. That doesn't mean property taxes should be raised for the whole subdivision."

Deeds filed with the county supply the sales information for the computerized three-year sales report which provides market price by subdivision, sales averages and other data.

The percentage of difference between the selling price and appraised value is computed. Large percentage differences in particular subdivisions will trigger close scrutinization by the assessor's office prior to the next tax season.

In the Pontiac system, a loss and adjust file is used to keep track of new construction or changes in structure such as building improvements. Resulting changes in assessment along with the reason coded in are reported in one listing.

A by-product of the loss and adjust system is the Change of Assessment Notification which is automatically printed. This letter informs the taxpayer of the amount of any change, the reason for the change and the time and place set by what's happened in regard to the assessment roll also are prepared and sent to the state.

The tape generated during operation of the loss and adjustment system is fed through Pontiac's maintenance system to update the property tax master file.

Following this update, the assessment roll is run. It lists property by subdivision, showing owner's name, mailing address, legal description of the property, mortgage, zoning and use codes and assessed valuation. Once this assessment roll is approved and the tax rate has been set, the tax roll may be printed.

In addition to the information on the assessment roll, the tax roll lists taxes by category and computes the city's 1% collection fee.

Of course, what the taxpayer sees is the actual bill. Printing of the tax bills is the most time-consuming operation for the Pontiac DP department, taking about 12 hours because of the number of necessary form changes.

At the time the bills are run, an accounts receivable file is created. As property owners pay their taxes through the City Treasury, the accounts receivable file is updated. The treasury has its own NCR 41 paper tape unit. At day's end, all paper tapes are input through a translation program using the NCR 736 key-to-tape unit.

The system rejects over- and underpayments. Partial payments will be accepted only if specially keyed.

Pontiac collects taxes for both the city and the county. However, it does not collect delinquent taxes. Each March, the delinquent tax role which adds penalties into the tax totals is sold to the county for collection.

Pontiac has two tax seasons: city tax bills are issued in July; county tax bills are prepared in December. Of course, Pontiac's system has a number of other capabilities including creation of personal property tax bills with depreciation figured in; yearly reports which summarize all new tax data by subdivision, bank code, zone and land use; and reports on cash received.

Citibank Gets Nonstop

CUPERTINO, Calif. – The first Tandem 16 Nonstop system has been delivered to Citibank in New York City, according to its vendor, Tandem Computers, Inc.

The system will be evaluated in a number of banking applications, the firm said.

The configuration includes two 16-bit processors with 128K bytes of core each, a 10M-byte disk with controller, 45 in./sec tape drive with controller, multiplexer, operator console, two CRT terminals and a line printer. The system cost $98,300.

Announcing the biggest breakthrough ever in core storage.

The MODCOMP 256K-byte memory module that made it all possible.

MEMORY+. It's an entirely new dimension in bulk memory for minicomputers. An add-on memory system used with MODCOMP computers to give you a whopping 4,000,000 bytes of directly accessible core storage. At far less cost than any other core memory you could ever buy. Until now.

It opens up vast new possibilities for storing those programs and data you can't accommodate in main memory, but frequently need to get at–super fast.

Because now you have the best of two worlds. The capacity of disc. With the high speed and reliability of main memory. At an amazingly economical price.

The big breakthrough came when we found a way to slash the cost-per-bit of core by condensing a massive 256K bytes of memory into a single memory plane. In a single MEMORY+ device, anywhere from one to sixteen of these memory modules go together for a total capacity of 4 megabytes.

Consider what MEMORY+ can mean to you.

Think of it as a giant extension to main memory. It's both word and block addressable, and it swaps data so fast it appears to be a part of main memory itself.

Think of it as a way to beat the sluggish speed of fixed head disc. With its core memory access time, and transfer rates as high as five megabytes per second.

Think of it as a shared memory in multi-processor systems. Two MODCOMP computers can be processing the same data at memory speeds, without tying up main memory.

Think of it as an operating system auxiliary memory. Boosting system throughput by providing fast access to often-used operating system files.

Think of it as a direct data path to main memory for external data, used as a high-speed buffer.

Any way you look at it, MEMORY+ is one giant step forward in real-time bulk storage.

And because of its modular design, you buy only the capacity you need now. As you need more, add more plug-in modules.

It's simple. It works. And it's available. Now.

Call your nearest MODCOMP sales office for full details. Or write for a comprehensive 20-page brochure that explains the whole MEMORY+ story.

Modular Computer Systems, 1650 West McNab Road, Ft. Lauderdale, FL 33309. Phone (305) 974-1380. European Headquarters: Export House, Woking, Surrey, England Phone (04862) 71471

MODCOMP MEMORY+

Four MEMORY+ devices give this MODCOMP computer an external core storage capacity of 16 megabytes, operating at main memory speeds.

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Mini Bits

HP Adds 9830B Calculator, Reduces Price of 9830A

PALO ALTO, Calif. – Hewlett-Packard Co. (HP) has introduced another model in its 9830 series of programmable calculators, reduced 9830A prices and added options to the 9830A.

The 9830B uses semiconductor memory recently developed for the HP 9825 calculator and comes with 15,808 bytes of read/write memory, built-in string variables and matrix operation capability, the firm said.

The basic 9830B costs $8,350; the system can be expanded to a total of 30,144 bytes for an additional $3,200.

HP also reduced the price of a standard 9830A with 3,520 bytes of memory to $4,900 from $6,800, a spokesman said.

Options to allow the user to completely replace the 9830A's memory and increase its memory to that of the 9830B were also announced by the firm at 1501 Page Mill Road, Palo Alto, Calif. 94304.

TI Puts 990 Micros on Rental

HOUSTON – Texas Instruments, Inc. (TI) has announced rental plans for its TI 990 microcomputer systems.

Systems available for rental are the Model 990/9900 prototyping system, Model 990/4 software development system and the Model 990/10.

The plan allows for 30-day cancellation privileges after a minimum 90-day period and includes conversion to sale provisions, TI said.

The 990/9900 prototyping system rents for $570/mo, the 990/4 for $642/mo and the disk-based 990/10 for $1,911/mo including installation and monthly maintenance. TI is at P.O. Box 1444, Houston, Texas 77001.

Workshop on Minis, Government

WASHINGTON, D.C. – A workshop on minicomputers in state and local government data processing will be held in Atlanta Aug. 27-29.

The workshop is cosponsored by the Special Interest Group on Minicomputer Technology of the Urban and Regional Information Systems Association and by the International City Management Association (ICMA).

Including sessions for management-level state and local government officials, the workshop is also aimed at DP technicians and people with small- and medium-sized organizations.

Registration fee is $125. Additional information is available from O. Martin Anochie, ICMA, 1140 Connecticut Ave. N.W., Washington, D.C. 20036.

Bank Saving $1.4 Million/Year

Minis Replace 370 for Stock Transfers

NEW YORK – With decentralization a corporate goal, Citibank here has installed eight high-performance minicomputers to perform stock transfers formerly done on an IBM 370/165.

Cost savings and improved access to resources were the two major reasons that the four divisions of the bank that handle this task went to minicomputers, according to John L. Hughes, vice-president of DP for Citibank's Securities and Government Services Group.

Hughes estimated the bank will realize cost savings of $1.4 million per year after an initial start-up expense of $750,000.

"Our use of Citibank's Central Data Center costs $2.8 million annually," he explained. "We are cutting that in half with lower cost hardware and software, fewer people and reduced operating expenses."

The eight stand-alone systems, which cost Citibank about $2.4 million, are being used in the four divisions, or "channels," at the bank.

Each channel has two of the configurations, Hughes said, and each configuration consists of an Interdata 8/32 Megamini with 524K bytes of main memory, three 300M-byte disks, two 75- and four 45 in./sec tape drives, two 600 line/min printers and approximately 20 local and remote CRTs.

The systems run Interdata's OS/32MT multitasking operating system. Cobol is used for the applications software; special terminal management and data base management software has also been implemented on the system.

Citibank selected Interdata after a review of several small systems, including a Digital Equipment Corp. PDP-11/70, Eclipse 3000 from Data General Corp. and the General Automation, Inc. SPC-16/440, Hughes said.

The Interdata mini was selected because its commercial software and architecture are similar with IBM's, Hughes said.

"IBM and Interdata hardware performance specifications are very similar," he said. "In fact, Interdata was the closest thing in the mini world to IBM.

"With the decentralized small computers, we have access to 4M bytes of high-speed mainframe memory compared with our 20% share of the 3M bytes on the IBM units."

Gives Channel Managers Control

Explaining how the minis will improve access to resources, Hughes said "each channel manager will have control over his entire operations with the decentralized DP operation.

"And," he added, "we have designed the systems to make our tasks less labor-intensive."

Using the minis for people savings is also effective, Hughes said. "We can combine the resources of the hierarchy managers and the controlling schedulers required in a centralized operation.

"The operations staff, which makes up about one-third of the people costs, can easily adapt to operating the decentralized systems," he added.

"The operators prefer the smaller systems because they enjoy seeing their tasks scheduled and completed rather than disappearing into a central computer and then reappearing some time later," he said.

Firm's Mission Accomplished After Gaining Processing Control

By Esther Surden
Of the CW Staff

FULLERTON, Calif. – The Mission Aviation Fellowship here switched from a service bureau to an in-house turnkey minicomputer for greater stability and more control of its processing load, according to Paul Fogal, director of finance for the firm.

The company, which supplies specialized services to national churches and mission organizations, decided to go with a minicomputer last year after running its applications on service bureau equipment since 1971

When the service bureau went bankrupt, the firm was pressed into a "crisis decision," Fogal recalled. In a quick look at minicomputer equipment, the firm considered Hewlett-Packard, Digital Equipment Corp. and General Automation; it chose General Automation because "of its proximity" to the firm.

Donor Automation, Inc., a Redlands (Calif.) systems house, provided the minicomputer with all software, Fogal said.

Applications running on the system include a donor accounting system, which keeps track of tax-deductible contributions and provides donors with receipts for the Internal Revenue Service. The system also keeps tabs on the types of direct mail that cause a donor to respond so future mailings can be scientifically selected, Fogal said.

Customizes Mailings

Computer letters in quantities as few as 50 can be generated economically by the system, Fogal said. Most service bureaus, he noted, will not attempt a mailing of less than 10,000 pieces.

Mission likes the ability it has to customize letters on a very selective basis, determined by narrow criteria such as locality and donation history, he noted. The letters are generated on a 200 line/min upper- and lower-case printer.

One of the system's important benefits, he noted is that it has eliminated time-consuming lookup, correction and resubmission of data.

(Continued on Page 25)

Turnkeys Work With Newspapers

MELBOURNE, Fla. – Two large-capacity, minicomputer-based processors, the models 2560 and 2570, have been added to Harris Corp.'s 2500 copy-processing line.

The turnkey systems are based on Digital Equipment Corp. PDP-11 minis, a spokesman added.

The Model 2560 is a dual-processor system with a large data base for editorial, wire, classified and display copy which can handle up to 96 editing and input terminals and associated peripheral devices, Harris said.

Its dual-processor configuration assures 100% backup for all copy in process, the firm claimed. A Model 2560 can be priced from $700,000.

The Model 2570 features a dual-processor controller linked to smaller processors which control simultaneous access by more than 380 terminals. It is priced from about $1 million to over $3 million.

Enhancements to the Model 2520 give it additional power at lower cost to serve a broader sector of the small- to medium-sized daily newspaper market, Harris said, while the Model 2550 has been modified to perform more advanced editing, data storage and copy-processing control functions for medium-size dailies.

Pricing for the Model 2520 ranges from $105,000 to over $250,000 and includes basic hardware, systems software and on-site vendor support. Pricing for the Model 2550 begins at $190,000.

All four processors accommodate disk storage subsystems also introduced. The subsystems, range from 66M characters to 264M characters.

Harris is at P.O. Box 2080, Melbourne, Fla. 32901.

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Motorcycle Dealer Gears System to Inventory Control

HUMBLE, Texas – A small business system dedicated to inventory control has allowed a motorcycle dealer here to cut his inventory investment in half and boost his profits by some 20%, he said.

"Eighty percent of our profits come from the sale of parts because of the relatively low markup on our motorcycles," Stanley Krenek, owner of Humble Yamaha, explained, "but we just couldn't keep our parts inventory up to date."

Krenek's inventory control system before he leased a minicomputer consisted of nearly 6,000 index cards, each representing a different part.

"Customers would buy parts, then we'd take those customer invoices with part numbers and try to update our records. We had a series of color-coded markers we put on the cards to show whether parts were on order, or back order or whatever," he said.

"We just couldn't keep up with the posting. We found we were typically a week behind even though we had a clerk doing nothing else for four or five hours a day. It was slow, tedious work."

"We knew we had to do something," Krenek recalled, "so we called some of the big computer companies. We were told that what we needed was time-sharing, but the costs involved didn't seem right."

I spoke to some people who had had experience with time-sharing systems and they told me about problems they had – that they could only use the system at certain times, for example, that they had been billed incorrectly in some cases and, most of all, that they didn't feel that they had control over their computing."

Stanley Krenek (standing), owner of Humble Yamaha, and Pat Miller (seated), the firm's parts manager, wrote the software programs for Humble's minicomputer system.

Krenek, who had had some experience with computers in college, decided to install a Wang 2200 system on a five-year lease/purchase contract at a cost of about $800/mo. He said he spoke to all the major mini suppliers and chose Wang because of price.

The system, which consists of a central processor and CRT console with 12K bytes of memory, a line printer and a 5M-byte disk, was installed two years ago.

Krenek and his parts manager, who had had no previous computer experience but learned to program in Basic in less than a month, programmed the minicomputer themselves.

"We wrote several programs," Krenek said. "One enabled us to enter all of our parts numbers and create a master file. We use a separate program for adding new parts numbers.

"A third program is used to update that parts list when part numbers are superceded. The original parts number remains in sequence, with a reference to the new part number. All of the original stock data we carried with the original part number is automatically transferred to the new part number.

"We wrote another program which allows us to update any of the information, new prices, for example, stored with any part number. Then we have a program which prints a 'price book' every week for our retail salesmen to use. It includes the part price and quantity in stock.

"Finally, we have a program which gives our parts manager a master printout of all the parts information we have on the system," Krenek noted, adding all of the programs he wrote are available for sale to other dealers.

Humble Yamaha's yearly sales volume is approximately $1 million and its parts sales run to nearly $125,000 annually. Krenek said Humble Yamaha's investment in parts inventory was nearly $45,000 before the minicomputer arrived.

"We began to see an improvement in our inventory within a couple of months. We increased our inventory turnover, but lowered our dollar investment by more than 15%," Krenek said.

Firm Accomplishes Mission

(Continued from Page 24)

When a letter is opened it can contain donations or mailing list changes. With the service bureau, the firm had to fill out forms to tell the bureau what to do.

If any mistakes were made, the service bureau's CPU would find them and Mission would receive an "edit" report showing the mistakes much later in the week. One of the organization's clerks would then have to research the mistakes, make corrections and resubmit the data.

Now the operators see the entry on the CRTs and, if any errors are evident, they can be corrected while the source document is still in hand, he said. Mission can also look up a contributor's past activity to make management decisions, he noted.

The hardware at Donor includes a General Automation DM-130 data management system with an SPC-16 mini with 64K bytes of core, 30M bytes of disk, two CRTs and a 200 line/min upper- and lower-case chaintrain printer.

Fogal estimated the in-house system probably "breaks even" in cost with the service bureau. However, the amount of work processed on the mini has increased since the company stopped farming out its work.

The service bureau cost Mission $1,200/mo. The in-house system cost $85,000 which, on a five-year basis, breaks down to $2,220/mo including interest paid on the loan to buy, a service contract and supplies, Fogal said.

The company is also saving the salary of one person, he added.

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DP has a ubiquitous terminal condition.

A special report on *Data Communications Terminals* in the July 26th *Computerworld*.

The dollar value of the U.S. installed base of both general and special-purpose terminals should increase to $25 billion by 1980, *$20 billion of which will be shipped in the next five years*, (based on estimates by International Data Corporation, the world's largest EDP market research firm). Clearly, more users than ever before are relying on terminals to provide solutions to complex problems, while increasing the utility and accessibility of their computer systems.

Computerworld will present a special report on Data Communications Terminals in the July 26th issue, including teleprinters, CRTs and intelligent terminals. Edited by Ron Frank, this supplement will cover a variety of topics of importance to data communications users, with application stories and tutorials throughout.

For example, we'll report on how new carriers and carrier services might affect the way terminals are used. We'll look at what applications require terminals with "intelligence" - i.e., processing logic and memory - and show you some of the best ways to make use of this hardware. We'll investigate what's being done to make the terminal environment easier to use. This includes items on recent teleprocessing software enhancements and new hardware features, to name a few. In addition, we'll report on where terminals are headed, and analyze what's been happening to the cost of terminals.

If you're involved with data processing, this is one subject you may want to be very familiar with. Don't miss it. It's in the July 26th *Computerworld*. If you're a terminal manufacturer, you should advertise here. Don't miss the July 9th ad closing. Call your *Computerworld* salesman for more details. Or call Judy Milford at (617) 965-5800.

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CI Notes

J.C. Penney Adds IBM To List of POS Suppliers

NEW YORK – J.C. Penney Co. has ordered up to 6,000 point-of-sale terminals from IBM for use in its stores throughout the country.

The contract with IBM is in keeping with the company's policy of having multiple sources of supply for POS equipment, according to Robert Capone, Penney vice-president and director of systems and DP.

Penney stores also have NCR Corp. and Singer Co. equipment. To date, NCR has installed 6,500 of its NCR 280 terminals and Penney has ordered up to 17,000 of these units, an NCR spokesman said.

The order for IBM equipment does not affect NCR's long-term contractual relationship with Penney, he added.

The terminals, part of the IBM 3650 retail store system, will be located on store selling floors. They will serve both as sales registers and data entry devices and, along with the in-store controller, will provide a link to IBM 370 mainframes in Penney's regional data centers when necessary.

GSI to Market Siemens Gear

ANAHEIM, Calif. – Siemens AG's Data Processing Division and General Systems International, Inc. (GSI) have signed a cooperative marketing pact under which both companies will market specific Siemens OEM products in the U.S. and Canada.

The products include disk drives up to 500M bytes, tape drives up to 250 in./sec and MOS memories from 32K to 2M bytes as well as printer supplies.

GSI designed the data entry system Siemens makes and sells in Europe. Willi Jilke, GSI president, said he expects the pact to eventually lead to manufacture by GSI of certain Siemens products in the U.S.

Supershorts

Vadic Corp. has licensed Computer & Systems Engineering Ltd. to manufacture and distribute Vadic's low- and medium-speed CCITT and VA3400 modems.

– – –

Tymshare, Inc. has signed an agreement with Taylorix, a West German service firm, to form a joint venture as a separately working company called Taylorix-Tymshare GmbH. The firm will provide remote computer services in West Germany.

– – –

Kennedy Co. has appointed Sintrom-Ellinor of London as its direct factory representative in the UK.

Terminal Values to Quadruple

EFT Base Seen Hitting $13 Billion in '86

By Toni Wiseman
Of the CW Staff

CAMBRIDGE, Mass. – The installed volume of equipment for electronic payment systems, including electronic funds transfer (EFT), is expected to grow in value from $5 billion this year to $13 billion in 1986, according to a study by Arthur D. Little, Inc. (ADL).

An increase from $100 million to $300 million in the annual value of related software and turnkey services during the decade from 1976 to 1986 was also projected.

But "firms wanting to be major suppliers should emphasize product or service packages or device sales to systems suppliers. Sale of individual devices or sofware products to end users should not be attempted by other than established firms," ADL cautioned.

The report, "The Outlook for Electronic Payment Systems and Related Products and Services," assessed changes and growth in the U.S. payment system environment that are significant to suppliers and users of DP equipment, software, specialized terminals and services.

The value of installed terminals for payments applications will quadruple from $1.5 billion in 1976 to more than $6 billion in 1986, according to the study.

The value of general-purpose computers supporting electronic payment systems will double in that same time frame, from the present figure of $3.5 billion to at least $7 billion, the report stated.

Some of the terminals will be general-purpose, but the greatest sales volume will be experienced by industry-tailored systems. Except for attended teller terminals, which are already selling widely, most types of terminals will not achieve maximum sales rates until 1981-84, when regulatory and market uncertainties will have diminished, ADL projected.

Law Reforms Seen

The study predicted major reforms in existing law and regulations in the next five years because of pressures from both consumers and various kinds of depository financial institutions – commercial banks, savings banks, savings and loans and credit unions.

Some of the changes forecast in the report included broadened use of off-premise electronic facilities, authorization for all depository financial institutions to offer interest-bearing demand (checking) accounts and equalization of consumer lending powers among depository financial institutions.

Continuing consumer pressures for transaction and privacy protection in electronic payment systems and for mandatory item-pricing on most supermarket goods were also seen by the study.

Such pressure may influence the direction of the electronic payments evolution, but will not prevent it, the report said.

The anticipated regulatory changes will

(Continued on Page 27)

Cbema Urges Change of Methods To Increase Trade With East

By Edith Holmes
Of the CW Staff

NEW YORK – In the interest of expanding the trade of DP equipment between Eastern and Western nations, the U.S. should give even more weight to the concept of treating each nation as a separate entity, according to Peter McCloskey, president of the Computer and Business Equipment Manufacturers Association (Cbema).

However, there are elements in the export control process working at cross-purposes, he said here recently.

"For our industry, East-West trade is really trading commercial products with separate countries with differing needs and markets. It is not really a black and white East-West issue.

"A socialist country no longer is considered a threat merely by its being socialist, nor should it be," he said.

McCloskey pointed out two problem areas in the U.S. attitude toward East-West trade: the "lack of a realistic balance between U.S. commercial and military security needs" and "the necessity for a joint government-industry understanding of what elements, factors and environment are necessary to develop sound commercial relationships with the East."

Balance of Considerations Urged

Advocating that the U.S. strike a balance between expansion of commercial relations and realistic and reasonable considerations of national security, McCloskey said "this balance must be based on consistent policy guidance that explicitly recognizes the environment and the factors critically necessary for the development of sound commercial relations and American competitiveness in the socialist markets."

In an effort to better coordinate government licensing evaluations, he suggested expanding and strengthening the roles of technical advisory committees to give them the ability to put some teeth into the changes they recommend.

While currently in existence, technical advisory committees and their recommendations have not affected either the U.S. or the informal International Coordinating Committee (Cocom), which consists of all North Atlantic Treaty Organization nations plus Japan but excluding Iceland, McCloskey said.

These committees are also not told what happens to their reports, he added, noting Cbema has recommended four-year terms for industry representatives on these committees.

Cbema has also recommended an

(Continued on Page 27)

PDP-8 Gets Own Marketing Unit

MAYNARD, Mass. – Digital Equipment Corp. has formed a single product-oriented marketing group for sales of its PDP-8 minicomputer.

The consolidated unit will provide marketing, promotion, technical support and hardware and software development. Marketing areas include industrial, laboratory, educational, engineering, computation, communications and original equipment manufacturers, a spokesman said.

"With over 30,000 PDP-8 computers installed, there is a large customer base of both end users and OEMs that require the integrated service our group can provide," according to James Willis, manager of the group.

"This concentration of effort in an integrated product line helps prevent redundancy of effort and affords new levels of development," he continued. Willis was previously responsible for PDP-8 marketing for OEMs.

The group's structure permits maintenance of a closer liaison with PDP-8 users than previously possible, he added.

Before the consolidation, the OEM group handled marketing for the large and small PDP-11s as well as the PDP-8, the spokesman said, adding most of the new group's personnel is from the OEM group.

The group will market PDP-8s from the PDP 8/A kit up to the PDP-8 systems in any market, OEM or end user, he said. However, the group will not handle the DEC Datasystem 300 series, typesetting and word-processing gear based on the 8 or the Classic, he noted.

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Cbema Urges U.S. Change Methods on East-West Trade

(Continued from Page 26)

amendment to the Export Administration Act on behalf of the computer industry that would require the government to inform the technical advisory committees of the reasons their recommendations were accepted or rejected, he stated.

A Cbema recommendation to the Senate Banking Committee which has been adopted requires technical advisory committee consultation on multilateral controls in addition to present consultation on unilateral controls, he added.

At present the only "commercial" technical representation available at the Cocom negotiations is supplied by a firm that is a defense contractor, McCloskey explained.

At the same time, he noted, representatives of the largest British computer firm sit with the British negotiators, and representatives of the largest French company sit with the French negotiators.

The Commerce Department must join the negotiating team to represent U.S. commercial interests, he urged. In addition, U.S. industry's technical advisory committees should be allowed to supply technical support and advice at the Cocom negotiations.

In the area of export licensing, McCloskey argued an exporter must have the right to know exactly why his license was denied if it is refused.

McCloskey also took issue with a recent House Appropriations Committee decision not only to deny the Office of Export Administration an expansion of resources to handle increasing licensing demands, but to cut back its resources from present levels.

On the security aspect of exporting DP equipment, he said "it is not realistic to assume the USSR or any other nation will depend upon a potential enemy to supply its computerized military computer needs that include servicing, spare parts and so on.

"Computers would have to be exported in considerable quantities and be of the very latest state-of-the-art in order to be a significant contribution to a potential enemy," he stated.

"Certainly, U.S. policies as they pertain to the export of computers are not consistent when we deny moderately advanced computers to the USSR, Eastern Europe and the People's Republic of China and, at the same time, export weapons systems containing highly sophisticated computers to nations whose long-term allegiance to the U.S. is questionable and where such technology is highly susceptible to uncontrolled leakage to what may be termed 'hostile nations,' " McCloskey said.

U.S. Policy Varies

As an example of the U.S. government's recognition "to some degree" that trade with socialist countries is not trade with a monolithic block, McCloskey said the U.S. has put a total embargo on trade with Cuba, North Korea, Vietnam and Cambodia.

Poland and Romania, however, receive most favored nation treatment by the U.S. Yugoslavia is generally treated as a Western nation, although applications for exports to it go to the Department of Defense, McCloskey continued.

Six socialist countries belong to the Western trade organization, the General Agreement on Tariffs and Trade (Gatt). "And we are all aware of the hostility between the People's Republic of China and the Soviet Union," he said.

The People's Republic of China has been given the same export control status as the USSR, McCloskey noted, but added China does not meet certain U.S. export control requirements. Accordingly, the U.S. is effectively not giving it the same treatment.

"Clearly, East-West trade in the computer area is not an uncontrolled transfer of strategic technology to a monolithic bloc," McCloskey said.

Electronic Payments Base Seen At $13 Billion in One Decade

(Continued from Page 26)

accelerate growing competition among depository financial institutions, according to ADL. With broader powers, thrift institutions will increasingly function as retail banks.

Some commercial banks, particularly those in the large, urban category, will retreat from the retail market to pursue growth opportunities in servicing thrifts and smaller banks, the report predicted.

Other banks will seek efficiencies through the use of lobby terminals, customer-bank communications terminals, minibranches and other manned but limited facilities, it said.

The market for all capabilities associated with electronic payment systems should therefore develop fairly evenly among all kinds of financial institutions involved, it added.

Preauthorized Deposits

By 1981, the existence of a national interconnection among automated clearinghouses (ACH) will help attract increasing volumes of preauthorized deposits and payments, such as Social Security and veterans' retirement, ADL predicted.

In that year, the ACHs will process an estimated 16 million federally issued payments monthly, rising to more than 40 million monthly by 1986, according to the report.

Growing volumes of automatic deposits from state and private as well as federal payrolls will generally provide a major impetus for public acceptance and usage of preauthorized transactions, it added.

Credit Card Use

Predicting that experimentation with other forms of payment technology by bankers will focus largely on point-of-sale transactions, the ADL study said credit card use will continue to proliferate over the next decade because of widespread consumer acceptance and broadened services offered by thrift institutions.

Interest-bearing transaction accounts – which combine savings, checking and open-ended credit – will begin to emerge as the preferred source of payments, it forecast.

Transaction Cards

Between 1981 and 1986, according to the timetable of the ADL report, a substantial portion of various debit, credit and check authorization cards will be replaced by transaction cards.

The transition will be slow, however, since the paper draft will continue to be the prevailing payment medium even as transaction card volume grows rapidly, ADL said.

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1. Japan will continue to increase imports of foreign-manufactured EDP equipment at the rate of 30% per year through 1977. In 1977, total Japanese DP imports will exceed $1 billion per year.
2. The U.S. share of the Japanese import market is 55%. This should remain constant, although in previous years the U.S. share has reached as high as 70%.
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4. Independent peripheral equipment purchases are expected to rise 44% in this period.

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Developing campus in Westchester County expanding its Computer Center for administrative applications using data base techniques. Opportunity to learn and develop in the implementation of new systems. Small team requiring and recognizing individual effort. Proficiency in the COBOL language, JCL or large systems required. Prior experience in additional institution helpful. Salary range for Jr. and Sr. positions: $12 to $18,000. Submit resume and salary history to:

Director, Computer Operations
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Purchase, N.Y. 10577
Equal Opportunity/
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DIRECTOR OF COMPUTER RESOURCES

Medical University of South Carolina
Charleston, South Carolina

Description: The Medical University of South Carolina invites nominations and applications for the position of Director of Computer Resources, the person with the principle responsibility for development and coordination of computer resources at the Medical University. The Medical University, located in Charleston, is comprised of Colleges of Medicine, Dental Medicine, Graduate Studies, Pharmacy, Nursing, Allied Health Sciences, and a 502-bed hospital. There is a current enrollment of 2,216 students. Some 615 faculty members are employed full-time and over 500 practicing professionals are on the clinical part-time staff. The total number of employees is approximately 5,000. **Qualifications:** Nominees and applicants should have a broad knowledge of computer systems, in general, experience in the health professions, and the ability to provide leadership in the application of computer technology among the health professions at the Medical University of South Carolina.

Please send letters of application or nomination and a resume to:

Dr. William E. Groves
Chairman, Search Committee for Director of
Computer Resources
Office of the President
MEDICAL UNIVERSITY of SOUTH CAROLINA
80 Barre Street
Charleston, South Carolina 29401

The deadline for applications or nominations is July 31, 1976. The Medical University of South Carolina is an Equal Opportunity Employer.

DIRECTOR, REGIONAL INFORMATION SYSTEMS

Local Government Multi-Agency Cooperative Computer Center

The government units in and around Lane County, in providing diverse services to the citizens, require the assistance of automated information processing for performing such functions as records keeping, tactical and strategic planning support, and reporting on local government action. Using advanced computer technology, the Director of the Regional Information Systems Department of Lane County directs this information processing service for the region. Lane County serves as the host agency to several government agencies in the surrounding area, sharing the computer resources to minimize duplication of data processing expense in delivering government services.

The regional enterprise is on the leading edge of new developments in applications of computer technology to government operations, and has attrracted international recognition. Under the position's direction, the Department operates, manages, and coordinates a sophisticated, heavily-used IBM 370 multiple CPU installation, including a large network of local and remote terminals, links to other computers, and a complex integrated data base involving the information processing for several government entities.

The position requires the ability to develop the capabilities of the computer, to derive the benefits from cooperation by all levels of government to build and maintain a comprehensive data base, to optimize the computer's use to support efficient and effective government services, reflected by increased worker productivity, and to promote and maintain its joint use by diverse governmental agencies.

This position, together with all other Department Heads, reports to the Chief Administrator of Lane County. Final authority for hiring or discharging this position is retained by the Board of County Commissioners.

Applicants should have considerable experience in data processing management, and preferably be knowledgeable and experienced in local government. The position will initially serve as Assistant Director during a two-month transition period of overlap with the current Director.

Applications may be obtained from the Personnel Office, Lane County Courthouse, 125 E. 8th, Eugene, Oregon 97401.

Data Processing Manager

Virginia public school system seeks experienced data processing manager. College degree (Masters desired) and knowledge of NCR COBOL and NEAT/3 required. Accounting systems background and B-3 operations experience preferred. Request application from Robert E. Jarvis, Dir. of Personnel, Loudoun County Public Schools, 20 Union St., Leesbrug, Va. 22075.

SYSTEMS ANALYSTS NORTH CAROLINA

$16-21,000. N.C. Based national corp seeks programmer analysts, systems analysts and software analysts for key positions in design and implementation of mfg environment. (IBM 370/OS/VS, COBOL). All fees paid. Contact J. Schwab at (704) 527-4980 or send resume to:

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CONSULTANTS
4000 Park Road
Charlotte, NC 28209

EDP WITH NCB

PROGRAMMER ANALYSTS

•

SYSTEMS ANALYSTS

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SYSTEMS DEVELOPMENT
AND
PACKAGE MANAGEMENT & INSTALLATION

All candidates must have three to five years EDP experience, with big system OS background. BAL is a must at the P.A. level. IMS, CICS on-line and banking experience is preferred. Individuality and creativity is recognized and rewarded.

We offer excellent working conditions in a large, modern IBM 370 facility in the suburbs, but close to the Interstate and public transportation — market adjusted, realistic salary and competitive benefits including bonus and profit sharing.

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Programmers

We are seeking talented programmers to work on challenging systems development projects. 3-5 years experience in software systems design and assembly language programming is required. Preference will be given to candidates with PDP—11 or IBM 360 programming experience and an advanced degree in computer science.

CCA is a young research-based company specializing in software products and professional services related to information systems. The company implements first-of-a-kind systems aimed at developing new technology in data-base management file organization, access methods, computer networks and related areas.

Please send resume to
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COMPUTER CORPORATION OF AMERICA

575 Technology Square
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We are a fast-growing New England company looking for someone with sales, marketing and business management experience in data communications, to fill an interesting position requiring all three skills and involving P&L responsibility for a small subsidiary. Knowledge of data communications field is essential, especially familiarity with companies in the field. Excellent working conditions in atmosphere geared to let you grow your own way. Good compensation arrangements with profit participation. Medium travel required.

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Harris Composition Systems Division in Melbourne, Florida, is adding to its professional engineering staff. Harris is the recognized leader in the design and development of electronic newsrooms, photocomposition systems and electronic typesetting for the newspaper and commercial printing markets.

We are seeking assembly language programmers to support the development of CRT terminal operating software and real time program modules in a minicomputer environment. Successful engineers will become members of a small group involved with the definition and implementation of large data base disc operating systems. Experience with PDP 11 equipment is very desirable.

Positions require B.S. or advanced degree plus 2-5 years related experience.

Harris Composition Systems is located in the heart of Florida's fabulous recreation area with miles of beaches, excellent fishing and the finest in sailing and boating waters. Harris offers attractive salaries, complete company benefits and a generous relocation policy. To arrange for your interview, send your resume and salary history, in confidence, to: W.T. Schaefer.

HARRIS

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HARRIS CORPORATION Composition Systems Division
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We are seeking a sales oriented individual who has a broad in-depth technical background in DP. Experience will have included operations programming, systems design and possibly management. He/she must be articulate, self-starting, able to work with minimum direction and have an innovative/imaginative attitude toward challenge.

Compensation package includes salary commensurate with experience; company paid pension; medical; life and wage continuance plans and frequent salary reviews.

Position located in sunny smog free Orange County California.

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NCR Progs, Banking, Gov't .... to 20K

If you plan a vacation trip South, please call two weeks in advance to arrange interviews. For more information about these and other opportunities, send a resume or call:

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15490 N.W. 7th Ave.
Miami, Fla. 33169
(305) 685-7891

Instructor

Computer Science Technology

Bachelors degree with at least three years of recent work experience as a Computer Programmer. Teaching experience desirable. IBM 360/370 DOS/OS ALC/ COBOL/FORTRAN experience desirable. OR In lieu of a degree, extensive experience or exceptional educational qualifications will be accepted subject to approval by Texas Education Agency.

Interested individuals should submit resumes to: R.V. Carswell, Computer Science Technology, Texas State Technical Institute, James Connally Campus, Waco, Texas 76705.

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Systems Engineering Support Group of major intelligent terminal manufacturer has immediate openings for Software Professionals with On-Line banking applications background. Experience with assembly language programming and Teller Terminals in Pre-Sale, Post-Sale customer environment a strong plus. Salary Mid Teens. Call me in confidence to discuss your background.

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5 years experience with micro/miniprocessors and real-time programming. In addition, a BS and MS in Math or Computer Science.

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  Five to 8 years experience required in application of programming and design on large-scale computers, extensive knowledge of COBOL language and a degree or equivalent experience in Computer Science. Minicomputer experience is desirable. Duties will be to analyze, design, code and document complex applications to large-scale electronic computers and associated equipment for business systems.
- **Scientific Programmer**
  Duties are to analyze, design, code and document complex applications to large-scale electronic computers and associated equipment for scientific systems.
- **Business Programmer**
  Duties will be to analyze, design, code and document complex applications to large-scale electronic computers and associated equipment for business systems. Two to 8 years of experience is desirable.

Boeing Computer Services Richland, Inc., provides vital support services to the Energy Research and Development Administration's Hanford Complex.

The Tri-Cities, Richland, Pasco and Kennewick, are well-known for a temperate climate, numerous recreational facilities, superb educational systems and excellent living conditions.

Submit your résumé to, or call, Wally Webster, (509) 942-7784, Boeing Computer Services Richland, Inc., Room 149-B4, P.O. Box 300-A4, Richland, WA 99352.

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BCS BOEING COMPUTER SERVICES, INC.

Data Processing Professionals

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You should have 2-4 years of IMS systems-programming experience concentrated in performance monitoring and tuning, data management and simulation. Experience with IMS/VS 1.1 would be a big plus

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Please forward a detailed resume including salary history and requirements and indicating specific position in which you are interested, in confidence to:

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MINICOMPUTER PROGRAMMER

Boeing Computer Services Richland, Inc., Richland, Washington, has an immediate opening for a Minicomputer Programmer.

A degree is desirable for this position, but not mandatory. Previous experience must include implementation of business system on Minis and at least two years experience with COBOL. Duties will include assisting in feasibility studies to determine those business systems that should be considered for conversion to Minis, developing procedures and standards, and providing system definitions and design documentation. In addition, candidate will analyze, design, code and document complex applications to large-scale electronic computers and associated equipment for business systems.

Boeing Computer Services Richland, Inc., provides vital support services to the Energy Research and Development Administration's Hanford Complex.

The Tri-Cities, Richland, Pasco and Kennewick, are well-known for a temperate climate, numerous recreational facilities, superb educational systems and excellent living conditions.

Submit your résumé to, or call, Wally Webster, (509) 942-7784, Boeing Computer Services Richland, Inc., Room 149-B3, P.O. Box 300-A4, Richland WA 99352

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Requirements include NCR banking application with 5 years professional experience. On-line and CIF/FOCIS expertise desirable.

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Applicants should have a Bachelor's degree in mathematics, statistics, computer science, or one of the scientific disciplines, plus a minimum of three to five years experience in programing business applications on an IBM system comparable to the one described above. Competence in programming COBOL is essential and programing experience in PL/1 or FORTRAN would be helpful.

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SYSTEMS ANALYST

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Qualified applicants will have a minimum of 3 years experience as a systems analyst in a manufacturing environment. Experience with distributive processing is a plus.

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SYSTEMS PROGRAMMER

- MVS experience highly desirable.
- Familiarity with OS internals essential.
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Merrill Lynch has taken yet another innovative step in providing more rapid, expanded and diversified customer service by developing one of the industry's largest and most sophisticated data centers. This unique 370 OS/VS/MVS/VM installation, utilizing the latest IBM CICS and IMS software packages, has created equally unique career growth positions for highly qualified programmer analysts.

These openings demand intensive experience, capacity to assume independent responsibility, and the desire to build a rewarding long-term future in an organization offering steady professional advancement.

We seek:

- Programmer Analysts with 370 BAL OS background, solid 3-5 years experience.
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Major international corporation is staffing Rocky Mountain locations. Requires seasoned programmers with 2-4 yrs. exp. Ideal background would include recent BC/BS (or other healthcare insurance applications) exp., preferrable med-to-large IBM systems. Must be currently proficient in BAL or ANS COBOL/DOS (OS o.k.), VS, CICS. All fees, intvw. & relocation paid. Start $14-18,000 d.o.e.

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PROGRAMMER/ANALYSTS

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Data General

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MAINE

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We are specialists in data processing placement.

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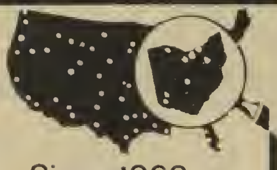

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Los Angeles, Ca.	(213) 930-1313
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Div. of Management Recruiters, Inc.

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Prog/Anal $14-18K
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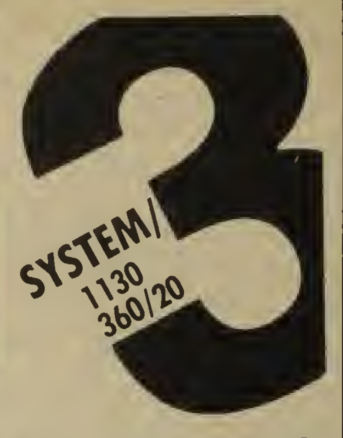

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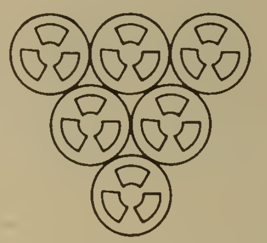

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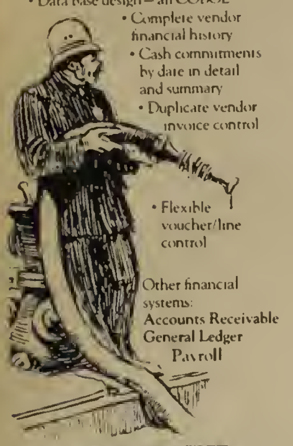

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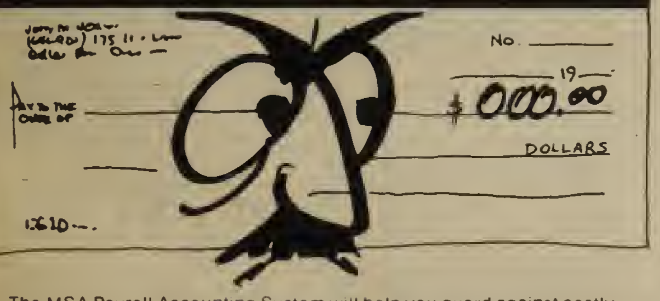

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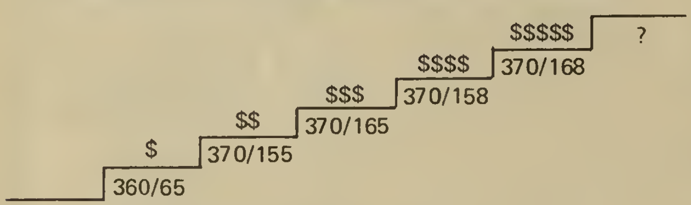

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Keydata Earnings Double, Revenues Rise in Quarter

WELLESLEY, Mass. – Keydata Corp. doubled its earnings for the third quarter on a 12% increase in revenues while posting even bigger gains in the nine months.

During the quarter, the timesharing firm's earnings reached $313,000 or 11 cents a share compared with $155,000 or 6 cents a share in the year-ago period. Tax credits were $147,000 and $74,000 respectively.

Revenues rose to $3.8 million compared with $3.4 million in the year-ago quarter.

Earnings in the nine months climbed to $794,000 or 29 cents a share including a $371,000 tax credit compared with $291,000 or 11 cents a share in the year-ago period, when there was a $135,000 credit.

Revenues rose to $11.1 million compared with $9.8 million in the year-ago nine months.

The firm has transferred its inventory of about 800 General Electric Terminet 300 terminals to Western Union Data Services, which will provide servicing for these units, according to L. Edwin Donegan Jr., Keydata president.

This arrangement will reduce the firm's long-term debt as well as result in improved customer service, he said.

Annual Earnings Drop at On-Line Despite Strong Fourth Quarter

PITTSBURGH, Pa. – On-Line Systems, Inc. finished the year with its strongest quarter of the 12 months. However, results for the year were less than those of a year ago.

The firm earned $356,251 or 42 cents a share in the fourth quarter compared with $82,599 or 10 cents a share in the same period last year.

Revenues rose to $3.7 million compared with $2.4 million in the same 1975 quarter.

During the year, earnings dropped to $816,211 or 97 cents a share compared with $1.3 million or $1.50 a share last year. Revenues rose to nearly $12 million compared with $11.4 million in 1975.

The decline in year earnings was the result of increased expenses caused by expansion of the firm's communications network, opening new offices and the newly acquired subsidiary in the UK, the firm said.

Earnings Quintuple in Nine Months As Microdata Quarter Net Up 177%

IRVINE, Calif. – Microdata Corp.'s nine-month earnings jumped fivefold while third-quarter earnings rose 177% compared with the results of the year-ago periods.

"This dramatic increase in performance reflects the company's increasing market penetration and significant gross margin improvements," according to Donald W. Fuller, On-Line president.

During the third quarter, revenues reached $8.5 million compared with $3.8 million in the 1975 period while earnings totaled $882,354 or 40 cents a share compared with $318,391 or 20 cents a share.

Nine-month earnings soared to nearly $1.9 million or $1.01 a share compared with $364,350 or 23 cents a share in the same period last year, when there was a $134,000 tax credit.

DG Results Increase At Nine Months' End

SOUTHBORO, Mass. – Data General Corp. (DG) turned in increased revenues and earnings in both the third quarter and nine months ended June 5.

In the quarter, earnings rose to $4.6 million or 48 cents a share compared with $2.9 million or 35 cents a share in the same period last year.

Revenues totaled $39.6 million compared with $24.9 million in the year-ago quarter.

During the nine months, earnings reached $12.1 million or $1.27 a share compared with $8.6 million or $1.05 a share in the same year-ago period.

Revenues rose to $102.7 million compared with $73.6 million in the 1975 period.

The firm added 1,370 employees during the nine months for a total of 4,650 and shipped 3,900 computers. The firm's plant facilities occupied 963,000 square feet as of the end of the third quarter.

...Toward the Bottom Line

Applied Digital Data Systems (Adds) has canceled its proposed offering of 800,000 shares of common. "Because of possible significant news developments, it would not serve the best interests of Adds shareholders to sell additional stock at this time," the firm said.

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Hewlett-Packard has no plans for a stock split at the present time, President William Hewlett said in a company publication.

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Shugart Associates has signed a $3 million revolving line of credit with Wells Fargo bank, replacing a $1 million line at a lower interest rate.

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National Semiconductor's 1976 sales will be over $320 million and sales for fiscal 1977 will show the largest dollar gains in the firm's history, according to President Charles E. Sporck.

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Automatic Data Processing of Clifton, N.J., has increased its dividend to 12 cents a share from 10 cents, payable July 1 to shareholders of record June 15. Shareholders have approved a two-for-one stock split.

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Centronics Data Computer has declared a dividend of 10 cents a share payable July 6 to holders of record June 7.

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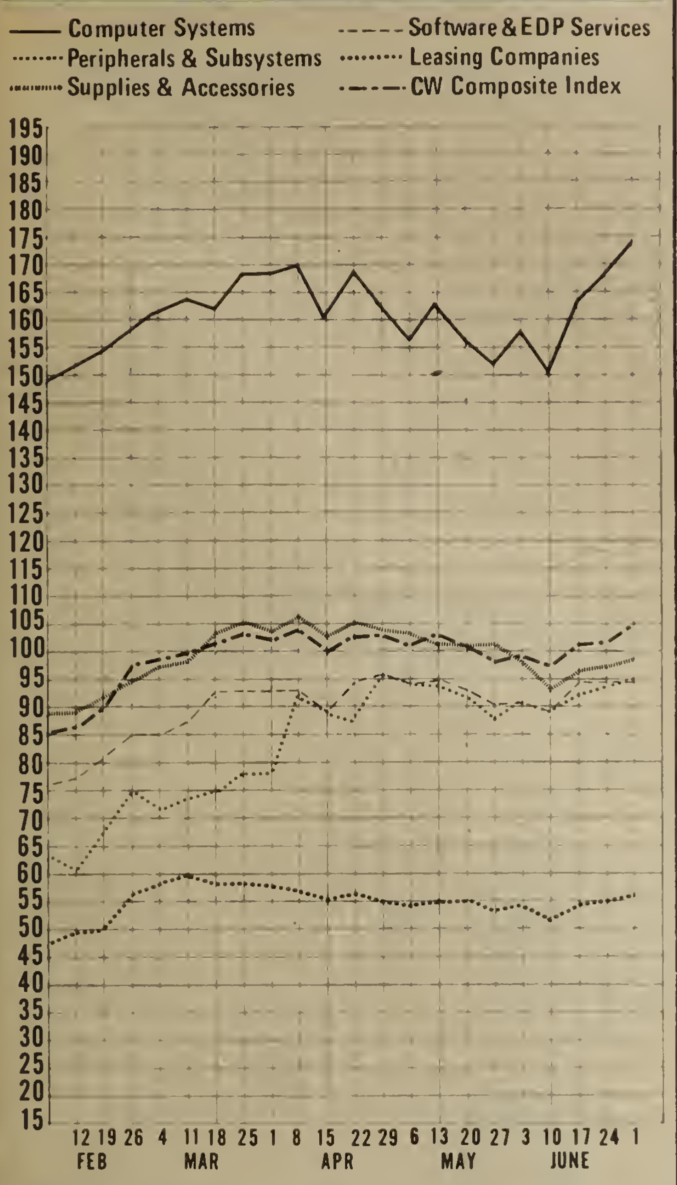

Earnings Reports

ELECTRONIC ASSOCIATES
Three Months Ended April 12

	1976	a1975
Shr Ernd	.....	$.15
Revenue	$5,504,000	7,739,000
Tax Cred	10,000	209,000
Earnings	(934,000)	403,000

a-Restated.

ELECTRONIC DATA SYSTEMS
Three Months Ended March 31

	1976	1975
Shr Ernd	$.26	$.30
Revenue	34,168,000	30,402,000
Earnings	3,199,000	3,708,000
9 Mo Shr	.82	.87
Revenue	97,985,000	91,177,000
Earnings	10,070,000	10,589,000

GREYHOUND COMPUTER
Three Months Ended March 31

	1976	1975
Shr Ernd	$.08	$.01
Revenue	14,455,000	15,832,000
Earnings	356,000	49,000

MEDICAL COMPUTER SYSTEMS
Three Months Ended March 31

	1976	1975
Shr Ernd	$.09	$.12
Revenue	2,190,199	1,765,130
Tax Cred	.....	153,000
Earnings	244,635	325,755

NUCLEAR DATA
Year Ended Feb. 29

	1976	1975
Shr Ernd	.....	$1.02
Revenue	$14,661,217	19,448,141
Tax Cred	a32,270	290,000
Earnings	14,687	941,042

a-Reflects $67,730 charge from retirement of certain debt.

SANDERS ASSOCIATES
Three Months Ended April 21

	1976	1975
Shr Ernd	$.22	$2.91
Revenue	48,343,000	48,938,000
Tax Cred	411,000	a12,956,000
Earnings	1,134,000	13,290,000
9 Mo Shr	.75	3.15
Revenue	147,187,000	129,335,000
Tax Cred	1,141,000	a13,222,000
bEarnings	3,567,000	14,399,000

a-Includes $7.89 million credit for debenture exchange. b-Includes $523,000 gain in 1976 and $324,000 in 1975 from sale of surplus manufacturing facilities.

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TRADE*QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, JUNE 30, 1976

All statistics compiled, computed and formatted by
TRADE★QUOTES, INC.
Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		PRICE 1976 RANGE (1)	CLOSE JUN 30 1976	WEEK NET CHNGE	WEEK PCT CHNGE
N	BURROUGHS CORP	84-108	104	+3	+2.9
O	COMPUTER AUTOMATION	10- 19	18 7/8	+2 1/8	+12.6
N	CONTROL DATA CORP	18- 27	23 5/8	+1 1/4	+5.5
N	DATA GENERAL CORP	40- 60	54 5/8	+2	+3.8
O	DATAPOINT CORP	24- 46	44 1/4	0	0.0
C	DIGITAL COMP CONTROL	2- 7	6 3/8	0	0.0
N	DIGITAL EQUIPMENT	138-181	176 3/4	+3 1/4	+1.8
N	ELECTRONIC ASSOC.	2- 5	2 7/8	+ 1/8	+4.5
A	ELECTRONIC ENGINEER.	7- 16	12 1/4	+ 3/8	+3.1
N	FOXBORO	28- 46	44	- 1/8	-0.2
O	GENERAL AUTOMATION	5- 11	7 1/2	+ 3/8	+5.2
O	GRI COMPUTER CORP	1- 1	1/2	- 1/8	-20.0
N	HEWLETT-PACKARD CO	95-117	114 3/4	+3 1/2	+3.1
N	HONEYWELL INC	34- 56	49 5/8	+1	+2.0
N	IBM	227-277	276 3/4	+4 3/4	+1.7
C	MANAGEMENT ASSIST	1- 3	1 7/8	0	0.0
O	MEMOREX	18- 33	29 3/4	+ 5/8	+2.1
O	MICRODATA CORP	10- 26	24 1/4	+1 1/2	+6.5
C	MODULAR COMPUTER SYS	9- 14	12 3/4	- 1/4	-1.9
N	NCR	24- 35	34 5/8	+2 1/4	+6.9
C	PRIME COMPUTER INC	4- 11	10	+ 3/4	+8.1
N	PERKIN-ELMER	19- 27	23 1/2	0	0.0
N	RAYTHEON CO	45- 60	59 3/4	+ 1/4	+0.4
N	SPERRY RAND	40- 51	51 1/4	+1	+1.9
O	SYCOR INC	20- 31	27 1/2	+ 1/2	+1.8
A	SYSTEMS ENG. LABS	6- 10	9 7/8	+1 7/8	+23.4
N	VARIAN ASSOCIATES	13- 17	15 5/8	+ 3/4	+5.0
A	WANG LABS.	11- 20	15 3/4	+1 1/4	+8.6

LEASING COMPANIES

EXCH		1976 RANGE (1)	CLOSE JUN 30 1976	WEEK NET CHNGE	WEEK PCT CHNGE
O	COMDISCO INC	3- 10	6 1/4	+ 1/2	+8.6
A	COMMERCE GROUP CORP	2- 3	2 3/4	0	0.0
A	COMPUTER INVSTRS GRP	1- 3	1 3/4	- 1/4	-12.5
M	DATRONIC RENTAL	1- 1	1 1/8	0	0.0
A	DCL INC	1- 1	5/8	- 1/8	-16.6
N	DPF INC	5- 8	7 1/4	+1	+16.0
A	GREYHOUND COMPUTER	3- 8	7 1/2	+ 3/8	+5.2
N	ITEL	6- 14	13 3/4	+1 1/4	+10.0
N	LEASCO CORP	6- 14	13 3/4	+1 3/4	+14.5
O	LEASPAC CORP	0- 1	1/4	0	0.0
C	NRG INC	0- 1	3/8	0	0.0
A	PIONEER TEX CORP	6- 9	7 1/2	+ 1/4	+3.4
N	U.S. LEASING	7- 12	10	+ 1/2	+5.2

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

SOFTWARE & EDP SERVICES

EXCH		1976 RANGE (1)	CLOSE JUN 30 1976	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	1- 2	1 1/2	- 1/8	-7.6
C	ANACOMP INC	9- 11	8 7/8	+ 1/8	+1.4
A	APPLIED DATA RES.	2- 3	3 1/4	+ 3/8	+13.0
N	AUTOMATIC DATA PROC	54- 69	67 1/4	- 3/8	-0.5
O	COLEMAN AMERICAN COS	3- 6	3 1/8	- 3/8	-10.7
C	COMPUTER DIMENSIONS	3- 7	4 3/4	0	0.0
O	COMP ELECTION SYSTMS	5- 9	7 1/4	- 1/4	-3.3
C	COMPUTER HORIZONS	1- 2	2	0	0.0
C	COMPUTER NETWORK	2- 6	3 7/8	+ 1/4	+6.8
N	COMPUTER SCIENCES	4- 8	7	+ 7/8	+14.2
C	COMPUTER TASK GROUP	1- 1	1 1/4	- 1/8	-9.0
O	COMPUTER USAGE	3- 6	3 1/2	0	0.0
C	COMSHARE	2- 9	7 1/4	- 3/4	-9.3
O	DATA DIMENSIONS INC	2- 4	3 1/2	- 1/8	-3.4
O	DATATAB	1- 1	1	0	0.0
N	ELECTRONIC DATA SYS.	12- 16	12 3/8	+ 1/8	+1.0
C	INFONATIONAL INC	1- 1	1/8	0	0.0
O	INSYTE CORP	1- 3	1 5/8	- 1/4	-13.3
C	IPS COMPUTER MARKET.	1- 2	1	- 1/8	-11.1
O	KEANE ASSOCIATES	2- 4	3	0	0.0
O	KEYDATA CORP	3- 5	2 5/8	- 1/8	-4.5
O	LOGICON	4- 4	3 3/4	0	0.0
A	MANAGEMENT DATA	1- 3	2 1/8	+ 1/8	+6.2
A	NATIONAL CSS INC	13- 25	22 1/4	+1 3/8	+6.5
A	ON LINE SYSTEMS INC	18- 22	18	+ 3/8	+2.1
N	PLANNING RESEARCH	3- 5	3 3/4	+ 5/8	+20.0
C	PROGRAMMING & SYS	1- 1	1/2	0	0.0
O	RAPIDATA INC	3- 5	2 3/4	- 3/8	-12.0
O	REYNOLDS & REYNOLD	13- 21	15 3/4	-1 3/4	-10.0
O	SCIENTIFIC COMPUTERS	1- 1	3/4	0	0.0
O	TYMSHARE INC	19- 28	25 1/8	- 1/2	-1.9
A	URS SYSTEMS	3- 5	3 3/4	+ 1/8	+3.4
N	WYLY CORP	2- 7	2 3/4	+ 1/8	+4.7

PERIPHERALS & SUBSYSTEMS

EXCH		1976 RANGE (1)	CLOSE JUN 30 1976	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADDRESSOGRAPH-MULT	8- 13	10	+1 1/8	+12.6
O	ADVANCED MEMORY SYS	4- 10	7 3/4	+ 1/4	+3.3
N	AMPEX CORP	5- 9	8 5/8	+1 1/8	+15.0
C	ANDERSON JACOBSON	2- 4	2 7/8	- 1/4	-8.0
O	APPLIED DIG DATA SYS	13- 25	24 1/2	+ 1/4	+1.0
O	BEEHIVE MEDICAL ELEC	3- 9	7 3/4	- 3/4	-8.8
A	BOLT,BERANEK & NEW	7- 11	10 1/2	+1 1/8	+12.0
N	BUNKER-RAMO	5- 9	9	+1 1/8	+14.2
A	CALCOMP	4- 7	5 7/8	+ 1/2	+9.3
O	CAMBRIDGE MEMORIES	2- 6	2 1/4	- 3/8	-14.2
N	CENTRONICS DATA COMP	20- 36	31 1/2	- 3/4	-2.3
O	CODEX CORP	22- 42	32	+ 1/2	+1.5
C	COGNITRONICS	1- 1	7/8	0	0.0
O	COMPUTER COMMUN.	1- 5	3 5/8	0	0.0
C	COMPUTER CONSOLES	4- 7	5 3/4	0	0.0
A	COMPUTER EQUIPMENT	1- 3	1 3/4	0	0.0
O	COMPUTER TRANSCEIVER	1- 3	1	- 3/8	-27.2
C	COMTEN	4- 9	7 3/4	+ 3/4	+10.7
N	CONRAC CORP	20- 25	21 7/8	-1 1/8	-4.8
O	DATA ACCESS SYSTEMS	1- 4	3 1/2	- 1/4	-6.6
O	DATA 100	7- 13	9 1/8	- 1/4	-2.6
A	DATA PRODUCTS CORP	5- 12	11 3/4	+1 1/2	+14.6
O	DATA TECHNOLOGY	1- 2	1 1/2	0	0.0
O	DATUM INC	1- 2	2 1/4	0	0.0
O	DECISION DATA COMPUT	1- 4	2	+ 1/8	+6.6
O	DELTA DATA SYSTEMS	1- 1	5/8	0	0.0
N	ELECTRONIC M & M	1- 3	2 1/2	+ 3/8	+17.6
O	FABRI-TEK	1- 1	5/8	0	0.0
O	GENERAL COMPUTER SYS	1- 2	1	0	0.0
N	HAZELTINE CORP	4- 12	9 3/4	- 1/8	-1.2
N	HARRIS CORP	34- 49	49 1/4	+1 1/8	+2.3
A	INCOTERM CORP	9- 20	12 1/8	+ 3/8	+3.1
O	INFOREX INC	3- 7	4 1/8	- 1/8	-2.9
C	INFORMATION INTL INC	10- 18	14 3/8	+ 1/8	+0.8
O	INTEL CORP	60-109	67 1/2	+5 1/2	+8.8
A	LUNDY ELECTRONICS	4- 7	4 5/8	+ 3/4	+19.3
O	MSI DATA CORP	3- 7	6 1/4	0	0.0
A	MILGO ELECTRONICS	15- 21	19 7/8	- 1/4	-1.2
N	MOHAWK DATA SCI	3- 8	7 3/4	+1 1/2	+24.0
O	PENRIL CORP	1- 3	2	0	0.0
A	PERTEC CORP	3- 8	6 1/8	+ 3/4	+13.9
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
C	PRECISION INST.	7- 10	5	0	0.0
O	QUANTOR CORP	4- 5	4 5/8	+ 5/8	+15.6
O	RECOGNITION EQUIP	6- 11	9 3/8	+ 3/4	+8.6
N	SANDERS ASSOCIATES	6- 11	9 7/8	+1	+11.2
O	SCAN DATA	2- 4	2 1/8	0	0.0
O	STORAGE TECHNOLOGY	9- 13	11 1/4	+ 5/8	+5.8
O	T BAR INC	5- 10	5 1/2	- 1/8	-2.2
O	TALLY CORP.	4- 6	5	0	0.0
C	TEC INC	3- 5	3 1/2	0	0.0
N	TEKTRONIX INC	45- 64	64	+3 1/2	+5.7
N	TELEX	2- 5	4	+ 1/2	+14.2
C	WANGCO INC	11- 22	20 3/4	+ 5/8	+3.1
O	WILTEK INC	2- 2	2 1/2	0	0.0

SUPPLIES & ACCESSORIES

EXCH		1976 RANGE (1)	CLOSE JUN 30 1976	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED SYSTEMS INC	1- 4	3	+ 1/4	+9.0
O	BALTIMORE BUS FORMS	4- 5	3 1/2	- 1/4	-6.6
A	BARRY WRIGHT	6- 10	8	+ 1/8	+1.5
O	CYBERMATICS INC	1- 1	5/8	0	0.0
A	DATA DOCUMENTS	32- 42	31 1/2	-1 1/2	-4.5
O	DUPLEX PRODUCTS INC	15- 24	14 3/4	- 1/4	-1.6
N	ENNIS BUS. FORMS	6- 8	6 5/8	- 1/8	-1.8
O	GRAHAM MAGNETICS	8- 13	8	0	0.0
C	GRAPHIC CONTROLS	13- 19	15	- 1/2	-3.2
N	3M COMPANY	53- 65	55 5/8	-2 3/8	-4.0
C	MOORE CORP LTD	40- 51	40 1/4	- 3/4	-1.8
N	NASHUA CORP	11- 17	15 7/8	+ 1/4	+1.5
O	STANDARD REGISTER	15- 19	15 1/2	0	0.0
O	TAB PRODUCTS CO	5- 10	9 3/4	+ 1/2	+5.4
N	UARCO	21- 25	21 1/8	- 1/8	-0.5
A	WABASH MAGNETICS	4- 8	7 3/4	+1	+14.8
N	WALLACE BUS FORMS	19- 25	19 1/2	- 3/4	-3.7

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